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Williams, Alison, Young, J, Kearney, Lauren, Keogh, Samantha (2013)
Improving knowledge of breastfeeding management: A practice
development intervention for paediatric nurses, *Neonatal, Paediatric and
Child Health Nursing*, 16:4, 8-14

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Title

Improving breastfeeding support: a practice development intervention for paediatric nurses

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Declarations

- The authors of this paper have no competing interests which would bias the publishing of this paper
- This project was funded through a Nursing Research Project Grant, donated by the Royal Children's Hospital Foundation (Qld) (grant number – 10245)
- Guarantor – please forward all correspondence to Jeanine Young
- Contributorship (see author list)

Abstract

Aim

This project aimed to increase the extent to which breastfeeding support was incorporated into everyday care by paediatric nurses within acute clinical practice settings. This intervention was evaluated regarding its impact on paediatric nursing knowledge of appropriate breastfeeding management.

Background

Breastfeeding provides the optimal method for infant growth and nutrition, yet studies have demonstrated knowledge deficits of Australian paediatric nurses regarding the management of the mother-infant breastfeeding dyad. Limited evidence is available evaluating which educational approach is effective in the dynamic and busy acute care setting.

Design

This study was a two-phased, mixed-method design, conducted in a large, tertiary metropolitan children's hospital in south-east Queensland, Australia.

Methods

Reference groups were conducted in phase one to advise development of the resource kit, and phase two was the experimental phase and included a pre-test knowledge survey, the educational intervention and a post-test knowledge survey.

Results

Pre and post-test response rates of 75% (n=49) and 34% (n=23) respectively were achieved from the population of 67 eligible participants. Post-intervention study results demonstrated knowledge improvement in four key breastfeeding management areas: importance of baby-led feeding; reduction in otitis media risk for breastfed infants; ongoing management of maternal milk supply when breastfeeding is interrupted; and the correct storage and management of expressed breast milk. Areas for further knowledge improvement included management of more complex breastfeeding scenarios, such as mastitis.

Conclusion

The implementation of a resource kit and brief education series has improved the knowledge of paediatric nurses in some areas of breastfeeding practice and management.

Implications for clinical practice

The improved breastfeeding knowledge and practical skills of paediatric nurses will promote the continuation of breastfeeding of the hospitalised infant. Given the recognised short and long term benefits of breastmilk for infants, optimising this support is essential.

Keywords

Breastfeeding, paediatric nurse, nurse education

Acknowledgements

Dr Robert Ware, Biostatistician, Queensland Children's Medical Research Institute, University of Queensland for his contributions to the statistical analysis.

Word Count

3796

**Improving breastfeeding support: a practice development intervention for
paediatric nurses**

INTRODUCTION AND BACKGROUND

Breastfeeding provides the optimal method for infant growth and nutrition, and is well recognised as the complete nutrition source during the first six months of life¹. The health benefits of breastfeeding are significant to mothers and infants, reducing the risk of multiple acute and chronic conditions, such as pneumonia, ear infections, Crohn's disease and childhood obesity^{1,2}. Breastfeeding is a key indicator of childhood health and well-being and has been listed as a priority area by international health agencies and governments³. Breastfeeding initiation rates are high for infants in Australia (96%), although only 39% are exclusively breastfed to three months of age³, with the figure falling to 15% by around six months, when complementary foods should be commenced³, and has been listed as a priority area for improvement by the Australian Institute of Health and Welfare⁴. Consistent, evidence-based breastfeeding support from health care professionals can significantly enhance a woman's ability and confidence to breastfeed⁵. However, many health professionals are provided minimal education to equip them to adequately support breastfeeding mothers^{6,7} thus compromising their ability to help. For example, one study cited 85% of undergraduate nursing students were unaware of the recommendation to breastfeed for at least a year⁸.

When an infant is admitted to hospital or attends an emergency department this can be a very stressful time for the family. How health care professionals manage this vital mother-baby breastfeeding dyad during this time has a crucial implication for the

ongoing success of breastfeeding. Stress is known to negatively affect breastfeeding and breastmilk synthesis^{9,10}, subsequently making this a high risk time to wean or supplement with artificial infant formulas.

McLaughlin and colleagues¹¹ investigated Australian paediatric nurses' knowledge and attitudes toward breastfeeding and found overall positive attitudes toward breastfeeding; however significant knowledge deficits in the areas of supplemental formula feeding, immunologic properties of breastmilk and duration and frequency of breastfeeding existed. This is consistent with other studies which also demonstrated positive attitudes among health care professionals, yet identified a lack of accurate knowledge and understanding around crucial aspects of breastfeeding^{12,13}.

RESEARCH OBJECTIVE

To address knowledge deficits identified in the earlier study¹¹, this project aimed to increase the extent to which breastfeeding support was incorporated into everyday care and discharge planning by nurses within clinical paediatric practice settings. The overall objective was to develop and pilot a specific breastfeeding support intervention aimed at promoting a consistent and sustainable approach to support paediatric nurses in an acute care hospital environment. This intervention was evaluated regarding its impact on paediatric nursing knowledge of appropriate breastfeeding management.

Research Questions

To achieve this research objective, three specific research questions were developed:

1. Given breastfeeding knowledge deficits of paediatric nurses identified in earlier studies ¹¹, and busy acute care clinical units in which they work, which method of breastfeeding support for clinicians would be most appropriate, feasible and acceptable?
2. What are the priority knowledge and practice needs of paediatric nurses caring for breastfed infants in the acute care setting?
3. What impact does a targeted breastfeeding support intervention have on paediatric nurses' knowledge of breastfeeding support and management?

METHODS

This study was a two-phased, mixed-method design, conducted in a large, tertiary metropolitan children's hospital in south-east Queensland, Australia.

Phase One

Phase One was the development phase and involved the formation of two reference groups. The aim of the reference groups was to address Research Question One, and specifically to determine the approach of breastfeeding support for paediatric nurses, which would be most appropriate, feasible and acceptable in acute paediatric settings.

Sample

Reference group one comprised of representation from the hospital family advisory council, Australian Breastfeeding Association (ABA), community child health liaison nurse, hospital dietician and a Baby Friendly Hospital Initiative co-ordinator (the hospital Baby Liaison Nurse was also invited, but unable to attend). Reference group two comprised of the nursing directors for medical, surgical, education and research divisions. Both reference groups were presented with clinical scenarios of typical

infant hospitalisation situations, designed to stimulate response, discussion and to prioritise paediatric nursing knowledge (or educational) and practice requirements to support breastfeeding in the acute care setting. A member of the research team who had over 20 years of clinical experience supporting breastfeeding mothers in both acute and community settings facilitated both groups. These sessions affirmed the direction of the educational intervention in the second phase of the study.

Phase Two

Phase Two was the experimental phase and included a pre-test knowledge survey, the educational intervention and a post-test knowledge survey.

Sample

The sample was drawn from the population of eligible paediatric nurses (n=67) working in an acute surgical unit of a metropolitan tertiary children's hospital in south-east Queensland, Australia. Eligibility criteria included being an enrolled or registered general nurse, full-time or part-time, permanently or temporarily employed in the selected unit. Nursing staff on leave (i.e. sick, maternity, recreational or long service) for more than four weeks during this time were excluded. This unit was chosen due to the high proportion of infants aged <12 months routinely admitted and the nurse unit manager's support for the project and its aims.

Intervention

The breastfeeding support intervention included a series of five 20-30 minute educational sessions delivered in a two week period by a nursing clinical facilitator with qualifications in child health nursing, midwifery and research. The five sessions included:

- Breastfeeding clinical scenarios

- Breastfeeding techniques
- Breastmilk expression (hand and mechanical) and management of expressed breastmilk
- Troubleshooting breastfeeding issues and supportive strategies for families
- Resources and referral pathways

Each session was repeated five to six times during the two week period to maximise opportunity for participation by clinicians. In addition, a practical resource kit including presenter and participant objectives for each of the five sessions, a DVD (*Baby-led Breastfeeding...The Mother-Baby Dance*¹⁴); breast model; a Clinician's Breastfeeding Triage Tool¹⁵; and posters of baby feeding cues, were provided to each clinical area to be used for ongoing education and as a clinical resource.

Data Collection

Phase one

Key words and themes were transcribed by the group facilitator (nurse researcher) from responses to the case scenario during reference group discussions. Emergent themes which reflected the concepts discussed were checked with participants during discussion and at the end of the sessions to ensure clarity and understanding¹⁶.

Phase two

Data were collected through a pre and post-test knowledge survey with a shortened version of the knowledge and attitudes survey tool used by McLaughlin and colleagues, which had been adapted and used with permission¹¹. The survey contained three sections: demographic information (9 questions); breastfeeding knowledge (20

questions, using a 5-point Likert scale); and breastfeeding knowledge relevant to the hospitalised infant (8 questions, using a 4-point Likert scale; 10 questions using a 5-point Likert scale)¹⁷.

Procedure

In liaison with the Nurse Unit Manager the roster schedule was used to identify current staff. Participants received a survey and information sheet distributed via the internal mail system. Consent was implied by the return of a completed questionnaire via the addressed return envelope. Respondents were asked to use a unique identifier to allow matching of pre and post-test surveys while ensuring anonymity of the individual. The same survey was administered prior to delivery of the education sessions, and then readministered during a two week period, four weeks after the education intervention. Ethical approval for the study was granted from the local hospital Human Research Ethics committee (approval number EC00175).

Data Analysis

Phase one data analysis

The responses generated from each of the reference group discussions were recorded and thematically analysed for emergent themes¹⁶ and checked with participants at the conclusion of each session. This data was then utilised to inform the development of the breastfeeding support resource sessions and kit.

Phase Two data analysis

Medians, inter-quartile ranges (IQR), frequencies and percentages were used to report the central tendency, spread and empirical distributions of categorical and non-symmetric continuous variables elicited at each survey. When continuous data were distributed symmetrically, the means and standard deviation were reported. All bivariate comparisons of categorical frequencies were undertaken using Fisher's exact test, while the Wilcoxon signed ranks test was used to detect pre-test – post-test differences based on the participant's response most consistent with the evidence. Participants completing both pre and post-test surveys were used in a paired analysis to determine intervention effectiveness in impacting nursing knowledge of breastfeeding the hospitalised infant. Statistical computations were facilitated with the use of IBM SPSS Statistics Version 20. An alpha-level of 5% was considered statistically significant for all comparisons.

RESULTS

Phase One

The verbatim data from both reference groups yielded four key concepts: (1) maternal support and reassurance; (2) maintenance of breastmilk supply; (3) referral sources; and, (4) the development of a clinical area breastfeeding support resource kit.

When presented with the clinical scenario, group participants stated that it was essential that the nurse provide support to the breastfeeding mother through verbal “praise and positive comments” regarding her efforts to provide breastmilk for her infant. This discussion also highlighted this dialogue as an opportunistic time for the nurse to “reiterate to the parent the health benefits of breastfeeding”.

The group members also discussed the importance of knowing how to maintain a mother’s breastmilk supply when it may be affected by the infant’s illness or stress of hospitalisation. This discussion centred on what paediatric nurses needed to know to support breastfeeding mothers which included use of breast pumps and privacy while expressing.

Thirdly, referrals and who was best equipped to support the breastfeeding family was discussed, which included the need for clarification around community child health nursing support, and support from other agencies, such as the Australian Breastfeeding Association, when the infant was hospitalised.

There was overall consensus for the need to establish a practically based, breastfeeding support resource for the clinical area, specifically designed for the needs of paediatric nurses to complement the considerable amount of health care literature already available that supports breastfeeding knowledge and practice.

Phase two

Pre-test survey data

Pre and post-test response rates of 75% (n=49) and 34% (n=23) respectively were achieved from the population of 67 eligible participants.

Demographic characteristics

Participant demographics are provided in Table 1. The mean duration of employment in an acute paediatric clinical setting was 7.7 years (SD $SD\pm 7.7$ years).

(Insert table 1 near here)

The pre-test survey also included the participants' sources of breastfeeding knowledge, with personal experience (26, 53.1%) and advice from professional colleagues (28, 57.1%) cited most often. Undergraduate nursing course (18, 36.7%); professional conferences (7, 14.3%); and professional journals (8, 16.3%) were also cited as breastfeeding knowledge sources.

Changes in breastfeeding knowledge

Forty-nine paediatric nurses completed the pre-intervention survey, with 23/49 (47%) also completing the post-intervention survey. Comparing those who completed the post-intervention survey against those who did not, there were no statistically significant differences found in any measured demographic variables.

Table 2 presents a summary of the correct responses (most consistent with the evidence) from the general and hospitalised infant breastfeeding knowledge sections

of the survey including the knowledge differences (if present) after the educational intervention.

(Insert Table 2 near here)

Within the questionnaire nurses were also asked under which circumstances breastfeeding would be recommended to cease. In all of the instances the correct answer was 'never'. Sore nipples and mastitis were support areas most poorly understood with around a third to almost half of the respondents, respectively, still not aware of correct management post intervention.

(Insert Table 3 near here)

DISCUSSION

The admission and treatment of an infant in hospital can cause considerable stress and concern for families. How nurses care for families, specifically in the area of breastfeeding during this time can dramatically affect the course of infant nutrition from that point forward. Informed by an earlier study that investigated the knowledge and attitudes of paediatric nurses regarding breastfeeding ¹¹, this study aimed to respond to these findings by a) developing an appropriate, feasible and acceptable strategy to meet the learning and support needs of paediatric nurses working in acute paediatric settings, and b) evaluating the effectiveness of this strategy.

Development of the breastfeeding support resource kit

One of the key aims of the study was to develop and test the impact of a targeted education clinical resource on paediatric nurses knowledge of breastfeeding support in a dynamic and demanding clinical setting. The reference group consultations yielded

important insights into the environment where the paediatric nurses worked and their perceptions of their learning and support needs in the area of breastfeeding. This prompted the development of the clinical area breastfeeding support resource. It was not the intention of the authors to provide a comprehensive course or online learning program about breastfeeding to the paediatric nurses, as these have been developed and found to be effective^{18,19}. Rather, the reference groups confirmed that the development of a complementary and practical resource kit, which could be immediately sourced by nurses in their clinical environments, would assist in informing effective help provided by a paediatric nurse to a breastfeeding mother-baby dyad. Attending to infant feeding and nutrition is a fundamental role within paediatric nursing, and should be supported within the health system¹ to ensure best practice and thus quality care for families. It is therefore essential that paediatric nurses be provided with an accessible, evidence-based support (and in this case a practical resource kit), which can inform best practice. In the absence of timely, specialised breastfeeding support (such as an International Board Certified Lactation Consultant), within the acute paediatric environment, it is not unreasonable that all clinical nurses working with mothers and babies be informed and supported in their role of providing effective infant nutrition support to families.

Reference groups, comprised of experienced clinicians, were in agreement that a further course on breastfeeding was not a priority as information about breastfeeding was available for paediatric nurses. What was identified as a feasible, acceptable and appropriate approach was the development of a practical resource kit that would be suitable for use in short sessions in busy clinical environments or that could be presented within a single three hour session by a clinical nurse (facilitator or educator), and act as a clinical resource or reference.

Knowledge of breastfeeding

Pre-survey results suggested that, overall, the cohort (n=49) was positive about breastfeeding, unanimously agreeing that 'breast is best' and that part of their role was to support breastfeeding mothers and infants. This finding is consistent with other studies, which also found general beliefs of paediatric nurses to be positive towards breastfeeding²⁰. Whilst this is encouraging, it does not necessarily enable a clinician to effectively manage a challenging breastfeeding dilemma with a sick infant and concerned mother. Several studies have reported that many health professionals state they are confident in their ability to support breastfeeding mothers yet their knowledge regarding correct management strategies is poor^{7,21}. Formal training and/or a user friendly educational resource on breastfeeding management produces more effective care practices and increased breastfeeding rates^{19,22}, than positive attitudes alone.

Effectiveness of the intervention in improving breastfeeding knowledge

Post-intervention study results demonstrated knowledge improvement in four key breastfeeding management areas: importance of baby-led feeding; reduction in otitis media risk for breastfed infants; ongoing management of maternal milk supply when breastfeeding is interrupted; and the correct storage and management of expressed breast milk.

Baby-led feeding is a fundamental aspect of breastfeeding and supported by significant evidence^{2,7}. When feeding may be interrupted by procedures, surgery or illness, baby-led feeding will assist in the re-establishment of supply. Correct

attachment to the breast is also a fundamental aspect of effective breastfeeding²³.

While the entire sample in McLaughlin et al's study¹¹ identified that the baby should have as much as the mother's areola in their mouth as possible, only 48% of their sample were able to correctly identify that audible swallowing was also an indicator of effective milk transfer. The participants unanimously correctly answered the attachment questions in this study, which is clinically important considering the importance of this component of breastfeeding knowledge.

Similarly, maintenance of maternal milk supply is often a key issue during the acute illness phase for an infant, when maternal willingness or ability to breastfeed directly may be impaired (e.g. infant Nil By Mouth). The improved knowledge of lactation maintenance and the use of hand or electric expression to maintain supply is a particularly important clinical practice improvement supported by the implementation of the breastfeeding support resource kit, and should secure the re-establishment of breastfeeding, if interrupted by infant illness. Correct identification by 100% of the participants that breastfeeding assists in reducing the risk of common paediatric illnesses is a positive finding. The paired data comparison also demonstrated a statistically significant improvement in the nurses' knowledge that breastfeeding reduces the risk specifically of otitis media, enabling paediatric nurses to convey this health promotion message to families of unwell or vulnerable infants in their care. Knowledge improvements were also present in the management and storage of expressed breast milk. Provision of evidence-based information and practical advice to parents while their infant is unable to directly breastfeed is an important role of paediatric nurses, and will support ongoing breastfeeding.

Areas for further improvement in breastfeeding knowledge

Human breastmilk differs markedly from all substitute infant feeding preparations, making it uniquely superior to alternatives². In this study, very limited improvement was demonstrated in the nurses' understanding that infant artificial formula is not equivalent to breastmilk, with only about half (56.5%) in the post-test survey identifying the correct response. This belief is held amongst many health care professionals in developed countries, with the attitude that breastfed infants are only marginally different from their artificially-fed counterparts⁷. The duration and exclusivity of breastfeeding, in accordance with recommendations, is directly influenced by the attitudes of health care professionals working with families. Taveras and colleagues²⁴ found that clinicians (both medical and nursing) did not believe that their advice to breastfeeding mothers on how long they should exclusively breastfeed for as very important, yet mothers were in fact influenced by the attitudes health professionals held toward aspects of infant feeding, such as artificial formula supplementation. An American study found a perceived neutral attitude from hospital staff regarding breastfeeding, to be directly related to not breastfeeding beyond six weeks, particularly in mothers who had intentions while pregnant to only breastfeed for a short time²⁵. This ambivalence toward the harm of artificial feeding is influenced by the absence of lactation management education in health care professional curricula, and subsequent paucity of breastfeeding management skills among health care professionals⁷. On the contrary, when education, even brief, is provided to health care professionals improvements emerge in breastfeeding rates and duration. A French randomised trial provided a short training program for primary care practising physicians in breastfeeding management. Those mothers who attended the routine follow up visits for newborn health checks with physicians trained in the breastfeeding skills were more likely to report exclusive

breastfeeding at four weeks and overall reported increased breastfeeding duration than the control group¹⁸. Similarly, a self-paced study module, which was guided by an on-site trained staff member was found to be a cost-effective strategy for improving nurses' knowledge of breastfeeding, and deemed a good fit for busy work schedules¹⁹. Our study has seen a basic education series and pragmatic resource kit improve paediatric nurses' knowledge of breastfeeding in some areas however it was beyond the scope of this study to examine the impact this had on inpatient and discharge breastfeeding rates. This is an area identified for further research.

Personal experience as source for breastfeeding knowledge

In this study very few participating nurses reported having breastfeeding related qualifications. The most often cited source of breastfeeding knowledge was personal experience (53.1%) and advice from professional colleagues (n=28, 57.1%). This finding is similar to other studies investigating where health professionals source their breastfeeding knowledge. A US study found that while paediatric nurses (n=95), had positive beliefs overall toward breastfeeding, their knowledge regarding specific management strategies was limited, with close to 75% of the cohort naming their own personal breastfeeding experience as their most valuable source of breastfeeding knowledge²⁰. Another relatively large North American study (n=405) of nurse practitioners and nurse midwives, working directly with mothers of young infants found that nearly 73% had breastfed (or their partner), and of these 24% indicated that it was this experience which had taught them the most about breastfeeding²¹. General practitioners in an Australian study also identified personal (or partner) experience as their most useful source of breastfeeding knowledge⁶, with other international studies finding personal experience as the number one source of breastfeeding knowledge²².

Whilst personal experience is one valid way of knowing in health care, it is not necessarily the best or most comprehensive source from which to draw, when specific or complex breastfeeding management strategies are required. This is demonstrated in the knowledge areas incorrectly answered by the participants in this study, specifically in the areas of supportive advice, such as mastitis management and care of sore and damaged nipples.

STRENGTHS AND LIMITATIONS

This study has reported the development of an acceptable and feasible resource kit of educational tools to support paediatric nurses developing practical skills to sustain breastfeeding of infants in an acute care setting. The pilot implementation of the resource kit was successful, and kits were made available in all hospital inpatient settings in collaboration with the nurse education team. Further evaluation is required following implementation across the institution, and assessment of any effect on inpatient and discharge breastfeeding rates.

CONCLUSION

An important aspect of everyday nursing care in paediatric acute care facilities is the support of breastfeeding families. This paper has described the implementation and effectiveness of a pilot breastfeeding education series and resource kit for paediatric nurses working in a large metropolitan tertiary children's hospital. While improvement in aspects of breastfeeding knowledge and management were identified, areas for ongoing education and knowledge development were also identified, such as knowledge of the harms of not breastfeeding.

IMPLICATIONS FOR CLINICAL PRACTICE

The improved breastfeeding knowledge and practical skills of paediatric nurses will promote the continuation of breastfeeding of the hospitalised infant. Given the recognised short and long term benefits of breastmilk for infants, optimising this support is essential. A hospital-wide implementation of the breastfeeding resource kits has occurred based on these pilot outcomes. A state-wide breastfeeding policy and practice standard is also now available to all nursing staff, with strong links promoting the continuum of care between acute and community services. Evaluation of this targeted education series and resource kit is required to fully optimise paediatric nursing support for breastfeeding mothers of sick infants.

ACKNOWLEDGEMENTS

This project was funded through a Nursing Research Project Grant, donated by the Royal Children's Hospital Foundation (Qld) (grant number – 10245). We would also like to thank Dr Robert Ware, Queensland Children's Medical Research Institute, University of Queensland for his contributions to the statistical analyses.

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Table 1. Demographic characteristics

Demographic variables	n (49)	(%)
<u>Gender</u>		
Female	45	91.8
Male	4	8.2
<u>Employment status</u>		
Full-time	27	55.1
Part-time <24 hours	10	20.4
Part-time >24 hours	12	24.5
<u>Level of practice</u>		
Enrolled Nurse	2	4.1
Registered Nurse	37	75.5
Clinical Nurse	10	20.4
<u>Post-graduate professional qualifications</u>		
Midwifery	7	14.3
Post-graduate paediatric	18	36.7
Neonatal	1	2
Community Child Health	2	4.1

Table 2. Breastfeeding knowledge of paediatric nurses

BREASTFEEDING KNOWLEDGE AREA	Correct responses	Correct responses	Correct responses	Difference p*
	Pre-test†	Pre-test (paired)‡	Post-test (paired)‡	
	(n=49) n (%)	(n=23) n (%)	(n=23) n (%)	
General Breastfeeding Knowledge				
Breastfeeding's contribution to infant health and development	49 (100)	23 (100)	23 (100)	p=0.56
Non-equivalence of breastmilk to formula	24 (50)	11 (47.8)	13 (56.5)	p=0.49
Maternal benefits of breastfeeding	47 (95.9)	23 (100)	23 (100)	p=0.32
Nutritional adequacy of breastmilk to 6 months of age	42 (85.7)	22 (95.7)	22 (95.7)	p=0.68
Breastfeeding duration parameters	9 (18.4)	5 (21.7)	5 (21.7)	p=0.28
Importance of <i>demand feeding</i> or <i>baby led feeding</i>	36 (73.5)	15 (65.2)	19 (82.6)	p=0.01
No usual need for fluids other than breastmilk in the first 6 months	25 (51)	12 (52.1)	16 (69.6)	p=0.01
Breast milk's influence of newborn immunity	49 (100)	23 (100)	23 (100)	p=0.65
Breastfeeding reduces the risk of otitis media	23 (47)	9 (39.1)	21 (91.3)	p=0.002
Skin-to-skin contact (Kangaroo care) helps to increase mother's milk supply	40 (81.6)	20 (87)	22 (96.2)	p=0.02
Importance of correct attachment of the baby to the breast	49 (100)	23 (100)	23 (100)	p=1.00
Importance of correct positioning of the baby for successful breastfeeding	37 (75.5)	19 (82.6)	19 (82.6)	p=0.76
Identification of the signs of effective milk transfer	43 (87.8)	20 (86.9)	23 (100)	p=0.13
Interference of supplemental artificial formula with breastfeeding in early weeks	29 (59.2)	18 (78.2)	16 (69.6)	p=0.64
Appropriate age to introduce complementary foods	30 (61.2)	14 (60.9)	13 (56.5)	p=0.75
Regulators of breastmilk production	39 (79.6)	19 (82.6)	22 (95.7)	p=0.03
Breastmilk changes to meet the baby's needs, whether baby is premature, newborn or 12 months old	27 (55.1)	14 (56.5)	18 (78.3)	p=0.19
Hormones which influence the production of breastmilk	35(71.4)	17 (73.9)	16 (69.6)	p=0.06
Importance of milk removal on milk production	48 (98)	22 (95.6)	23 (100)	p=0.01
Hospitalised infant breastfeeding knowledge				
Influence of stress on breastfeeding	46 (93.9)	23 (100)	23 (100)	p=1.00
Importance of maintaining lactation through expressing while infant unable to directly breastfeed	48 (97.9)	23 (100)	23 (100)	p=0.56
Expiration times of expressed breastmilk	44 (89.8)	20 (87)	22 (95.7)	p=0.03
Importance of expressing intervals	14 (28.6)	9 (39.1)	8 (34.8)	p=0.18
Maternal diet and nutritional status of breastmilk	5 (10.2)	2 (8.6)	6 (26.1)	p=0.01
Maternal fluid intake and breastfeeding	39 (79.6)	19 (82.6)	20 (87)	p=0.7
Effectiveness of breastfeeding as an analgesic for infants experiencing painful procedures	30 (61.2)	15 (65.2)	19 (82.6)	p=0.13
Appropriate storage conditions and times for breastmilk	33 (67.3)	15 (65.2)	18 (78.2)	p=0.05
Mother's permission should be sort before offering baby anything other than breastmilk	49 (100)	23 (100)	23 (100)	p=1.00
Mothers of babies with established feeding should express at the time that their baby would normally feed	45 (91.9)	21 (91.3)	23 (100)	p=0.01

†using all data available from pre-test respondents (n=49)

‡using data from nurses who responded to both pre- and post-test questionnaires (n=23)

*p values were calculated on the change of knowledge using the Wilcoxon signed ranks test

Table 3. Reasons to cease breastfeeding

INFANT CONDITION / CIRCUMSTANCE	<i>Correct responses</i>	<i>Correct responses</i>	<i>Correct responses</i>	<i>Difference</i>
	Pre-test (n=49) [†] n (%)	Pre-test (paired) [‡] (n=23) n (%)	Post-test (paired) [‡] (n=23) n (%)	<i>p</i> *
Infant is in hospital	39 (79.6)	19 (82.6)	20 (87)	p=0.63
Infant is teething	35 (71.4)	17 (73.9)	19 (82.6)	p=0.5
Infant has frequent, loose stools	36 (73.5)	16 (69.6)	18 (78.3)	p=0.63
Infant has an infection	39 (79.6)	18 (78.3)	20 (87)	p=0.63
Infant appears to be continually hungry / unsatisfied	37 (75.5)	18 (78.3)	21 (91.3)	p=0.38
Mother has sore nipples	25 (51)	13 (56.5)	15 (65.2)	p=0.69
Mother has mastitis	26 (53.1)	11 (47.8)	12 (52.2)	p=1.00
Mother is tired	35 (71.4)	17 (73.9)	18 (78.3)	p=1.00

[†]using all data available from pre-test respondents (n=49)

[‡]using data from nurses who responded to both pre- and post-test questionnaires (n=23)

*p values were calculated on the change of knowledge using the Wilcoxon signed ranks test