Paediatric nurses’ knowledge and attitudes related to breastfeeding and the hospitalised infant

ABSTRACT
Breastfeeding and breastmilk are essential to hospitalised infants and young children and paediatric nurses are required to have breastfeeding knowledge. However, few studies have investigated paediatric nurses’ knowledge and attitudes towards breastfeeding. A descriptive, cross-sectional survey design was used to investigate breastfeeding knowledge, knowledge related to breastfeeding the hospitalised infant, policy and guideline awareness, and attitudes to breastfeeding. Participants demonstrated excellent breastfeeding attitudes and general knowledge but deficits in breastfeeding knowledge related to specific outcomes were identified.

Keywords: breastfeeding, breastmilk, paediatric nurse, knowledge, attitudes

BACKGROUND
Hospitalisation is stressful for infants and young children, as well as for parents and other family members. This stress is not only due to the unexpected illness or injury, but upheaval in family routines and unfamiliar environment (Long 2003; Ygge & Arnetz 2004; Hopia et al 2005; Diaz-Caneja et al 2005; Page-Goertz & Riordan 2010; Murray, Kenardy & Spence 2008; Nicolau & Glazebrook 2008; Arlidge et al 2009). This is important because stress can impact on breastfeeding and breastmilk synthesis (Lau 2001; Page-Goertz & Riordan 2010; Lau et al 2007). Paediatric nurses routinely care for hospitalised infants and young children and are expected to have breastfeeding knowledge. Little is known about what influences nurses’ breastfeeding knowledge and attitudes (Karipis & Spicer 1999; Hellings & Howe 2004; Wallis & Harper 2007), although it appears that skills are gained through trial and error (Wallis & Harper 2007).

The sick infant or young child needs the natural biological components of breastmilk, not only for nutrition and immunological protection, but because breastmilk reduces the severity of illness (Leung and Sauve 2005; Kull et al 2002; Quigley, Kelly & Sacker 2009). Indeed, the risk of nosocomial infections is reduced for hospitalised breastfed infants (Rodriguez, Miracle & Meier 2005).

Nevertheless, breastfeeding is easily interrupted by hospital admission as well as the illness or disability for which the admission has occurred. Both the emotional bond that exists between the infant and mother and the physical nature and process of breastfeeding is affected (Page-Goertz & Riordan 2010). Breastfeeding in the first six weeks postpartum is a particularly fragile and challenging period as many unique factors influence new mothers’ feeding choices (Sheehan, Schmied & Barclay 2009). Therefore, if a hospital admission occurs within this time, it has the potential to be devastating to breastfeeding success.

Unfortunately, mothers report that they often receive inconsistent advice about breastfeeding from healthcare professionals including nurses (Humenick, Hill & Spiegelberg 1998; Simmons 2002a, 2002b; Graffy & Taylor 2005; Rowe & Barnes 2006). Nurses, with appropriate knowledge and skills associated with breastfeeding can influence whether infants continue to breastfeed during hospitalisation (Taveras et al 2004; Szucs, Miracle & Rosenman 2009). A high priority therefore, is that paediatric nurses have the correct knowledge, skills and attitudes to facilitate continued breastfeeding and lactation and support mothers and their families whilst a breastfed infant is hospitalised (Young et al 2006a, 2006b; Eronen, Pincombe & Calabretto 2007; Watkins & Dodgson 2010).

Previous research has revealed that nurses have reasonably good overall knowledge of the appropriateness of breastmilk and breastfeeding, although this is inconsistent (Karipis & Spicer 1999; Wallis & Harper 2007). A study of Australian paediatric nurses identified that paediatric nurses had good overall breastfeeding knowledge, with most participants recognising that infants gain all the nutrients they require from breastmilk until the age of six months (136, 92%), and that the benefits of breastfeeding cannot be reproduced by infant formulas (142, 97%). However, just over half (78, 53%) of these same paediatric nurses recognised that infant formulas are not the nutritional equivalent of breastmilk (Karipis & Spicer 1999). Hellings and Howe (2000, 2004) reported on a study of 77 paediatric nurse practitioners from Oregon, USA in which a considerable proportion of the sample (68, 88%) agreed that breastmilk was the only source of nutrition required until the age of four months. Paediatric nurses from a large Midwestern inner city hospital and community paediatric clinic in the USA agreed that exclusive breastfeeding should continue to an infant age of six months (Szucs, Miracle & Rosenman 2009). Focus groups produced conflicting view points from paediatric nurses about weaning, with some staff indicating six months, others twelve months and others stating longer, as long as it is desired by the mother-infant dyad (Szucs, Miracle & Rosenman 2009). A study reported by Williams and Pennington (2003) of 127 paediatric nurses and health care assistants based in a paediatric hospital in Derbyshire, United Kingdom (UK), found that only about two thirds of the sample (85, 67%) knew the recommended age to wean.

Taken together, these studies suggest that a wide range of breastfeeding knowledge deficits exist across paediatric settings.

Research Question
On the basis of the literature reviewed above, the following research question was posed: what is the current knowledge and attitudes of paediatric nurses related to the hospitalised breastfeeding mother – infant/child dyad?

METHOD
Study Design
A descriptive, cross-sectional survey design was used to examine breastfeeding knowledge, knowledge related to breastfeeding the hospitalised infant, policy and guideline awareness, and attitudes to breastfeeding, in a paediatric nurse population from metropolitan and regional paediatric hospital settings.

Target Population and Setting
The target population comprised of paediatric nurses working in a regional hospital and metropolitan tertiary paediatric hospital. Operating Theatres, Central Sterilising Department and Radiology staff were excluded due to their limited time providing breastfeeding support and advice to parents. Nurses working in Paediatric Outpatient Departments were included as these nurses are often required to provide information and support for breastfeeding families. Relief agency staff were also excluded.

Survey Tool Development and Testing
A questionnaire was developed first, to measure breastfeeding knowledge and attitudes. Established and validated tools for use with other healthcare professionals were instrumental in developing this questionnaire with consent from each of the principal authors (Lowe 1990; Cantrill, Creedy & Cooke 2003a, 2004; Hellings & Howe 2000, 2004; Spear 2004; Freed et al
The questionnaire comprises seven sections with 139 items: 1) demographic information (13 multiple choice items), 2) breastfeeding knowledge (24 five point Likert scale items), 3) hospitalisation and breastfeeding (8 four point categorical and 23 five point Likert scale items), 4) breastfeeding observation (2 three point categorical and 5 multiple choice items), 5) policies and recommendations (10 three point dichotomous), 6) breastfeeding experience (7 three point dichotomous items) and 7) breastfeeding attitudes (19 three point dichotomous items).

Face and content validity was tested through pilot testing and review by an expert panel. The questionnaire was pilot tested with 15 paediatric nurses to test content validity and identify specific issues that participants may have regarding the questionnaire. Pilot participants identified policy, protocol and recommendation items that needed to be included such as the Baby-Friendly Hospital Initiative and The Ten Steps to Successful Breastfeeding and Infant Feeding Guidelines for Health Workers. It was also suggested that diagrams be enlarged. The questionnaire was then presented to an expert panel of six for content validity. The panel comprised six experts in breastfeeding and research. The content was endorsed by the expert panel following changes in phrasing of two items.

Tool Reliability
Reliability of the covariate was calculated for internal consistency reliability using Cronbach alpha for sections two, three, five and seven of the questionnaire. Internal consistency reliability is strongest for a Cronbach alpha result of 0.7 or above (Pallant, 2001) but often internal consistency reliability is accepted below this result. Each section showed good internal consistency.

Recruitment and Sampling Strategy
In liaison with nurse unit managers, a convenience sample of 461 paediatric nurses were identified from staff rosters in the selected areas and contacted through the internal mail systems. Participants were provided with a questionnaire, information sheet and return addressed internal mail envelope. Informed consent was assumed by the return of a completed questionnaire. A reminder letter and questionnaire were sent six weeks later to optimise the response rate. Ethics approval was granted by the human research ethics committees for both hospital organisations and the university.

Data Analyses
Data were analysed using the Statistical Package for the Social Sciences (SPSS) 14.0.0 for Windows for the questionnaire (SPSS 2005). Five point Likert scales were collapsed and analysed as correct or incorrect (consistent with best evidence) along with descriptive statistics. Data with negative interpretations were reversed so that all high scores equalled high knowledge levels. The influence of the nurses’ practice area on levels of knowledge was analysed using a one-way between-groups analysis of variance (ANCOVA). The relationship between the time spent working with infants and their families was analysed using Pearson product-moment correlation coefficient.

RESULTS
Participants
A total of 241 questionnaires were returned which gave a response rate of 53%. Ninety-two percent (222) of participants were employed in the metropolitan hospital district (Table 1). The majority were female and a number were over 40 years of age. They were employed across different nursing levels, with the majority being level 1 Registered Nurses (RN NO1). Just over half were working part-time and just less than half had experience of providing nursing care to infants for ten years or less. A number of qualifications and resources related to breastfeeding were reported (Table 1) with participants citing more than one. For those who had their own children, either they, or in the case of male nurses, their partner had breastfed, but only 42% (100) stated that their child had breastfed for six months or longer. No participant was able to score 100% on the questionnaire but some paediatric nurses achieved a 100% correct score for specific sections.

Nutrition, Health and Breastfeeding
The longer participants had worked with neonates/infants and their families corresponded with higher levels of knowledge which was identified with a significant, positive correlation [r= .24, n=239, p<0.001] using Pearson product-moment correlation coefficient.

Participants were asked about general breastfeeding knowledge and the attachment and physiology of breastfeeding. The majority recognised that breastmilk is the best source of nutrition for infants and most acknowledged that breastfeeding has positive health implications for mothers. Some believed infant formula is a nutritional equivalent to breastmilk and a number were unaware that supplemental formulas can interfere with the success of breastfeeding (Table 2). A diverse range of responses were obtained about the nutritional and immunological standards of breastmilk and breastfeeding and the disadvantages and risks of using infant formulas which are summarised in Table 2. General immunologic benefits of breastmilk were known by 97% (234). Knowledge levels were relatively low concerning the specific preventative aspects of breastmilk and the impact of the use of infant formulas (Table 2).

Attachment and Physiology
Commonly, participants were unsure about the stages of lactogenesis and the associated hormones, but some demonstrated knowledge regarding prolactin and oxytocin (Table 2). All knew that correct attachment is important to successful breastfeeding. Diagrams (Figure 1) of correct attachment were provided to participants which many were unable to recognise (Question 1 (183, 76%) and Question 7 (109, 46%)). All were able to identify that the baby should have as much of the mother’s areola in its mouth as possible but only 116 (48%) agreed that audible swallowing ascertains that the baby is receiving milk from the breast. Demand feeding was recognised as best practice but this conflicted with knowledge on length of time to breastfeed a baby. Over half did not know that pacifiers and teats can cause nipple confusion when infants are initiating breastfeeding (see table 2).
Most (216, 90%) recognised that stress can impact on breastfeeding success and that having an infant hospitalised was not a reason to wean. Participants were asked when a mother should stop breastfeeding, identifying a number of situations while hospitalised and breastfeeding issues for mothers. ‘Never’ was the appropriate answer to each situation and this was recognised by a large proportion of the sample (Table 3).

### Table 1: Demographics and Characteristics of Participants

<table>
<thead>
<tr>
<th>Participants</th>
<th>Number</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Main practice area</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PICU</td>
<td>28</td>
<td>12%</td>
</tr>
<tr>
<td>Surgical Ward</td>
<td>45</td>
<td>19%</td>
</tr>
<tr>
<td>Medical Ward</td>
<td>32</td>
<td>13%</td>
</tr>
<tr>
<td>Oncology Unit</td>
<td>23</td>
<td>10%</td>
</tr>
<tr>
<td>Outpatients Department (OPD)</td>
<td>14</td>
<td>6%</td>
</tr>
<tr>
<td>Department of Emergency Medicine (DEM)</td>
<td>27</td>
<td>11%</td>
</tr>
<tr>
<td>Paediatric Ward of a Regional Hospital</td>
<td>19</td>
<td>8%</td>
</tr>
<tr>
<td>Community Centre</td>
<td>33</td>
<td>14%</td>
</tr>
<tr>
<td>Pool</td>
<td>8</td>
<td>3%</td>
</tr>
<tr>
<td>Other</td>
<td>7</td>
<td>3%</td>
</tr>
<tr>
<td>Nursing Education</td>
<td>3</td>
<td>1%</td>
</tr>
<tr>
<td><strong>Female</strong></td>
<td>232</td>
<td>96%</td>
</tr>
<tr>
<td><strong>Age</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;25</td>
<td>31</td>
<td>13%</td>
</tr>
<tr>
<td>25–29</td>
<td>28</td>
<td>12%</td>
</tr>
<tr>
<td>30–39</td>
<td>72</td>
<td>31%</td>
</tr>
<tr>
<td>40–49</td>
<td>63</td>
<td>26%</td>
</tr>
<tr>
<td>≥50</td>
<td>44</td>
<td>18%</td>
</tr>
<tr>
<td><strong>Level of employment</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EN</td>
<td>7</td>
<td>3%</td>
</tr>
<tr>
<td>RN NO1</td>
<td>146</td>
<td>61%</td>
</tr>
<tr>
<td>RN NO2</td>
<td>46</td>
<td>19%</td>
</tr>
<tr>
<td>RN NO3 (now abolished)</td>
<td>24</td>
<td>10%</td>
</tr>
<tr>
<td>RN NO4 &amp; above</td>
<td>18</td>
<td>7%</td>
</tr>
<tr>
<td><strong>Experience working with infants and children</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;5 years</td>
<td>58</td>
<td>24%</td>
</tr>
<tr>
<td>5–9 years</td>
<td>35</td>
<td>15%</td>
</tr>
<tr>
<td>10–14 years</td>
<td>54</td>
<td>23%</td>
</tr>
<tr>
<td>15–19 years</td>
<td>41</td>
<td>17%</td>
</tr>
<tr>
<td>20–24 years</td>
<td>21</td>
<td>9%</td>
</tr>
<tr>
<td>≥25 years</td>
<td>29</td>
<td>12%</td>
</tr>
<tr>
<td><strong>Employment status</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fulltime</td>
<td>102</td>
<td>42%</td>
</tr>
<tr>
<td>Part-time &lt;24 hours</td>
<td>72</td>
<td>30%</td>
</tr>
<tr>
<td>Part-time ≥24 hours</td>
<td>59</td>
<td>25%</td>
</tr>
<tr>
<td>Casual</td>
<td>8</td>
<td>3%</td>
</tr>
<tr>
<td><strong>Academic Qualifications</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>General Hospital Certificate</td>
<td>107</td>
<td>44%</td>
</tr>
<tr>
<td>Post-Registration Certificate</td>
<td>77</td>
<td>32%</td>
</tr>
<tr>
<td>Diploma/Degree</td>
<td>154</td>
<td>64%</td>
</tr>
<tr>
<td>Post Graduate Certificate</td>
<td>44</td>
<td>18%</td>
</tr>
<tr>
<td>Post Graduate Diploma</td>
<td>28</td>
<td>12%</td>
</tr>
<tr>
<td>Masters</td>
<td>8</td>
<td>3%</td>
</tr>
<tr>
<td>Diploma Child Care</td>
<td>1</td>
<td>&lt;1%</td>
</tr>
<tr>
<td>Enrolled Nurse (endorsed)</td>
<td>5</td>
<td>2%</td>
</tr>
<tr>
<td><strong>Breastfeeding Resources</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Midwifery course</td>
<td>71</td>
<td>30%</td>
</tr>
<tr>
<td>Lactation course</td>
<td>12</td>
<td>5%</td>
</tr>
<tr>
<td>Undergraduate nursing course</td>
<td>44</td>
<td>18%</td>
</tr>
<tr>
<td>Journals</td>
<td>65</td>
<td>27%</td>
</tr>
<tr>
<td>Professional colleagues</td>
<td>139</td>
<td>58%</td>
</tr>
<tr>
<td>Lactation consultant</td>
<td>2</td>
<td>&lt;1%</td>
</tr>
<tr>
<td>Child health nurse</td>
<td>8</td>
<td>3%</td>
</tr>
<tr>
<td>Conferences &amp; workshops</td>
<td>74</td>
<td>31%</td>
</tr>
<tr>
<td>Personal experience</td>
<td>146</td>
<td>61%</td>
</tr>
<tr>
<td><strong>Children &amp; Breastfeeding</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Do you/your partner have children?</td>
<td>142</td>
<td>60%</td>
</tr>
<tr>
<td>You/your partner ever breastfed?</td>
<td>142</td>
<td>60%</td>
</tr>
<tr>
<td>You/your partner breastfed &gt;3 months</td>
<td>124</td>
<td>52%</td>
</tr>
<tr>
<td>You/your partner breastfed &gt;6 months</td>
<td>100</td>
<td>42%</td>
</tr>
</tbody>
</table>

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**Breastfeeding the Hospitalised Infant**

Most (216, 90%) recognised that stress can impact on breastfeeding success and that having an infant hospitalised was not a reason to wean. Participants were asked when a mother should stop breastfeeding, identifying a number of situations while hospitalised and breastfeeding issues for mothers. ‘Never’ was the appropriate answer to each situation and this was recognised by a large proportion of the sample (Table 3).
The benefits of skin-to-skin contact produced mixed responses. Less than a third knew that it aids in increasing breastmilk supply (77, 32%) and that it helps improve a mother's breastfeeding confidence (73, 31%) but over half (138, 58%) recognised that it reduces the need for supplemental formulas in the first two weeks of life.

Diet does not influence the nutritional status of breastmilk. Many had this knowledge (196, 82%) and that normal daily fluid intake of two to three litres is needed (207, 87%) to sustain breastmilk supply. Mothers need to express breastmilk to maintain supply when infants are Nil By Mouth (NBM) and 81% (196) knew that expressing should be done by the mother at the infant’s normal feeding times. Incongruously participants agreed that mothers could express whenever ‘they feel like it’ (94, 39%) or were unsure (35, 15%) when mothers should express when their infant is hospitalised. A large proportion did not know that breastfeeding aids in paediatric pain relief (143, 60%) and reduces the risk of infant pneumonia beyond six months of age (190, 79%).

State, National and International Policies and Recommendations
A summary of knowledge in relation to local, national and international policies and recommendations concerning breastfeeding and breastmilk substitutes is provided in Table 4 and identifies knowledge deficits in this area.

Attitudes
Almost all participants believed that breastmilk is best (230, 96%) and 221 (92%) indicated that mothers should be encouraged to breastfeed. A small proportion (5, 2%) thought they would feel uncomfortable seeing a breastfeeding mother...
Knowledge and attitudes. Those working in community settings have knowledge deficits regarding audible swallowing (Karipis Creedy & Cooke 2004; Wallace & Kosmala-Anderson 2007) but some were uncertain of the ABA’s positioning and attachment (Karipis and Spicer 1999; Cantrill, Creedy & Cooke 2003b; Goetz & Riordan 2010), therefore it is important that paediatric nurses understand this fact however few participants could suggest that nurses and midwives are aware of the importance of attachment is important to breastfeeding success and paediatric nurses have practical knowledge regarding lactogenesis. Correct knowledge and skills in public and another five (2%) were unsure. A similar number (4, 2%) were embarrassed by breastfeeding. The hospital is a public environment and participants were divided on how they felt mothers may feel about being comfortable breastfeeding in public places; agreed 78 (33%), disagreed 91 (38%) or were unsure 69 (29%).

Most participants (230, 96%) agreed that partners are important to breastfeeding success and believed that children should be exposed to breastfeeding practices as a natural course of growing up (221, 92%). Thirty percent (71) thought mothers should be discrete when breastfeeding, but most (223, 93%) did not believe it needed to be behind closed doors. Sixty-two participants (26%) did not agree breastfeeding should continue until two years of age and beyond and 45 (19%) were unsure.

Participants identified support for breastfeeding mothers as important (227, 95%) and 97% (233) recognised that mothers need emotional support. The Australian Breastfeeding Association (ABA) provides support and information for mothers and healthcare professionals, but some were uncertain of the ABA’s role (37, 15%). Participants did identify that they knew where to obtain information for both professional use (160, 67%) and for parents and families (163, 68%).

ANCOVA was used to explore the influence between practice area and level of knowledge in relationship to the hospitalised infant, policies and recommendations and attitudes. A significant difference (p≤0.0001) was found for each of these areas of knowledge and attitudes. Those working in community settings had a higher mean score than others.

DISCUSSION
The findings of this study indicate that paediatric nurses do understand that breastfeeding is best for both the mother and child, but they may be unsure about the physiology of lactation and attachment. The implications of these knowledge and skills deficits, particularly for the support of the breastfed hospitalised infant are discussed below.

Breastfeeding Knowledge
Participants who had been working with neonates/infants and their parents for longer periods of time had higher levels of breastfeeding knowledge. That they knew breastmilk provides superior nutrition for up to six months following birth, supports previous research with paediatric nurses (Karipis and Spicer 1999), and other healthcare professionals (Cricco-Lizza 2006; Cantrill, Creedy & Cooke 2003b; Brodribb et al 2008). Participants were also aware of the positive implications for mothers. Infants formula was considered by a considerable proportion to be a nutritional equivalent to breastmilk consistent with studies of Australian paediatric nurses (Karipis and Spicer 1999) and doctors (Brodribb et al 2010), international doctors (Freed et al 1995) and nursing students (Cricco-Lizza 2006).

Participants did not realise the impact of supplemental formulas on successful breastfeeding which corresponds with a third of Australian midwives (Cantrill, Creedy & Cooke 2003b). If paediatric nurses are unaware of the potential damage supplementation may cause to breastfeeding, the possibility remains that infant formula feeding may be endorsed while the infant is hospitalised. Encouragingly, participants did recognise that breastmilk meets the exact needs of the infant, regardless of age which demonstrates paediatric nurses may advocate for the continuation of breastfeeding during hospitalisation. Some thought four months of age was appropriate to introduce solids which is a concern when the WHO and other organisations recommend commencement of complimentary foods around six months of age (Kramer & Kakuma 2002; WHO & UNICEF 2003; NHMRC 2003; WHO 2011b).

As found in previous studies (Cantrill, Creedy & Cooke 2003b, 2004; Hellings & Howe 2000, 2004; Spear 2004; Brodribb et al 2007; Mainstone 2008), the positive immunological benefit of breastmilk was widely accepted although details were less well understood. Few understood that breastmilk prevents otitis media matching previous research with healthcare professionals (Freed et al 1995; Brodribb et al 2010).

Knowledge deficits regarding lactogenesis and the associated hormones is an issue for many healthcare professionals (Freed et al 1995; Hellings & Howe 2000; Register et al 2000; Wambach et al 2005; Spear 2006) including the current study participants. Hospitalisation and stress may interrupt the natural process of hormone release and subsequently breastfeeding (Lau 2001; Page-Goetz & Riordan 2010), therefore it is important that paediatric nurses have practical knowledge regarding lactogenesis. Correct attachment is important to breastfeeding success and paediatric nurses understood this fact however few participants could identify specific factors associated with attachment. Evidence suggests that nurses and midwives are aware of the importance of positioning and attachment (Karipis and Spicer 1999; Cantrill, Creedy & Cooke 2004; Wallace & Kosmala-Anderson 2007) but have knowledge deficits regarding audible swallowing (Karipis

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Table 3 — When Should Mothers Stop Breastfeeding?

<table>
<thead>
<tr>
<th>Breastfeeding Knowledge, n=241</th>
<th>Correct, n(%)</th>
<th>Incorrect, n(%)</th>
<th>Unsure, n(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>*Hospitalised infant</td>
<td>189 (79%)</td>
<td>44 (18%)</td>
<td>7 (3%)</td>
</tr>
<tr>
<td>*Infant is teething</td>
<td>203 (85%)</td>
<td>22 (9%)</td>
<td>14 (6%)</td>
</tr>
<tr>
<td>*Infant has frequent, loose stools</td>
<td>182 (76.5%)</td>
<td>29 (12%)</td>
<td>27 (11.5%)</td>
</tr>
<tr>
<td>*Infant has an infection</td>
<td>206 (86%)</td>
<td>21 (9%)</td>
<td>13 (5%)</td>
</tr>
<tr>
<td>*Infant appears to be continually hungry/unsatisfied</td>
<td>186 (77%)</td>
<td>32 (13.5%)</td>
<td>23 (9.5%)</td>
</tr>
<tr>
<td>*Mother has sore nipples</td>
<td>129 (53.5%)</td>
<td>89 (37%)</td>
<td>23 (9.5%)</td>
</tr>
<tr>
<td>*Mother has mastitis</td>
<td>130 (54%)</td>
<td>75 (31%)</td>
<td>35 (15%)</td>
</tr>
<tr>
<td>*Mother is tired</td>
<td>177 (73%)</td>
<td>52 (22%)</td>
<td>12 (5%)</td>
</tr>
</tbody>
</table>

*These items were arranged to indicate high knowledge, high scores

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*Hospitalised infant 189 (79%) 44 (18%) 7 (3%)
Infant has frequent, loose stools 182 (76.5%) 29 (12%) 27 (11.5%)
Mother has sore nipples 129 (53.5%) 89 (37%) 23 (9.5%)
Mother has mastitis 130 (54%) 75 (31%) 35 (15%)
Mother is tired 177 (73%) 52 (22%) 12 (5%)
Table 4: Knowledge of National and International Policies & Recommendations

<table>
<thead>
<tr>
<th>Breastfeeding Knowledge, n=241</th>
<th>Correct, n(%)</th>
<th>Incorrect, n(%)</th>
<th>Unsure, n(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>*I have heard about the Baby-Friendly Hospital Initiative (BFHI)</td>
<td>84 (36%)</td>
<td>130 (54%)</td>
<td>24 (10%)</td>
</tr>
<tr>
<td>*I know what the Ten Steps to Successful Breastfeeding comprises</td>
<td>43 (18%)</td>
<td>103 (43%)</td>
<td>94 (39%)</td>
</tr>
<tr>
<td>*The Ten Steps to Successful Breastfeeding promotes breastfeeding and deters the use of infant formulas.</td>
<td>99 (41%)</td>
<td>18 (8%)</td>
<td>122 (51%)</td>
</tr>
<tr>
<td>The International Code of Marketing of Breastmilk Substitutes permits hospitals to give out free samples of infant formula</td>
<td>90 (38%)</td>
<td>14 (6%)</td>
<td>135 (56%)</td>
</tr>
<tr>
<td>Prolonged exclusive breastfeeding does NOT reduce the risk of Sudden Infant Death Syndrome in accordance with the World Health Organization (WHO)</td>
<td>97 (40%)</td>
<td>37 (16%)</td>
<td>105 (44%)</td>
</tr>
<tr>
<td>*I know what the Infant Feeding Guidelines for Health Professionals by the National Health and Medical Research Council (NHMRC) is about</td>
<td>55 (24%)</td>
<td>85 (35%)</td>
<td>96 (41%)</td>
</tr>
<tr>
<td>*I know where I can obtain a copy of Infant Feeding Guidelines for Health Professionals.</td>
<td>87 (36%)</td>
<td>81 (34%)</td>
<td>70 (30%)</td>
</tr>
<tr>
<td>Optimal Infant Nutrition is an evidence-based guideline for parents published by the Queensland Government</td>
<td>12 (5%)</td>
<td>47 (20%)</td>
<td>177 (75%)</td>
</tr>
<tr>
<td>*Exclusive breastfeeding to 6 months of age is recommended by Queensland Health, NHMRC and WHO</td>
<td>162 (67%)</td>
<td>9 (4%)</td>
<td>67 (29%)</td>
</tr>
<tr>
<td>*WHO recommend that breastfeeding is continued until the age of 2 years and beyond in addition to other complimentary foods</td>
<td>58 (25%)</td>
<td>48 (20%)</td>
<td>131 (55%)</td>
</tr>
</tbody>
</table>

*These items were reversed to indicate high knowledge, high scores

and Spicer 1999; Cantrill, Creedy & Cooke 2004), slow deep and rhythmic jaw action and a relaxed infant whilst feeding (Karipis and Spicer 1999). Understanding of diagrammatic representation of good attachment was poor. This is worrying when these representations are readily available to all paediatric nurses, other healthcare professionals and the general public now and during the study (Queensland Health, 2008).

The BFHI encourages demand feeding to successfully initiate and continue breastfeeding (UNICEF 2009; Forster & McLachlan 2007) which participants generally knew, yet some indicated breastfeeds should last only 30 minutes. Pacifier and artificial teat use have been associated with unsuccessful breastfeeding initiation, nipple confusion and decreased breastfeeding duration (Vogel, Hutchison & Mitchell 2001; Forster & McLachlan 2007; Eglash, Montgomery & Wood 2008). Over half the participants were unaware of this evidence. No studies have reported healthcare professionals’ knowledge of pacifier or artificial teat usage and the implications associated with breastfeeding.

Infant Hospitalisation and Breastfeeding Knowledge

Hospitalisation of children is well documented as stressful for parents (Teare & Smith 2004; Tyler & Hellings 2005; Page-Goertz & Riordan 2005; Tsuruta et al 2005; Diaz-Caneja et al., 2005) and the physiology of lactation is affected by stress (Lau 2001; Biancuzzo 2005; Luxner 2005; Lau et al. 2007) which was recognised by most participants. Healthcare professionals’ knowledge regarding maternal stress and breastfeeding during infant/child hospitalisation was not previously reported in the literature, yet evidence demonstrates that breastmilk production may be impaired by mothers’ stress levels, given her concern and anxiety related to hospitalisation (Dewey 2001; Wenner 2007). Also, a significant proportion of admissions to paediatric hospitals are neonates and some mothers will require assistance with establishment as well as the maintenance of breastfeeding for their child. Paediatric nurses are in a position to advocate for a supportive and conducive environment for breastfeeding mothers.

Participants were asked when to stop breastfeeding. The majority of participants knew that none of the situations and issues presented in the questionnaire were an acceptable reason which corresponds with previous research with healthcare professionals (Freed et al 1995; Hellings & Howe 2000; Cantrill, Creedy & Cooke 2003b). Many participants would recommend ceasing breastfeeding when mothers have mastitis or cracked nipples indicating similar knowledge to nursing students (Spear 2006) but fewer than reported in previous studies (Hellings & Howe, 2000). Other studies have identified that breastfeeding women with mastitis have been incorrectly advised by healthcare professionals to stop breastfeeding (Scott et al 2008), when removal of breastmilk through continued breastfeeding provides relief (Amir & Ingram 2008; Scott et al 2008).

Fewer participants were either unsure or would advise ceasing breastfeeding if the infant had frequent loose stools or the infant appeared to be continually hungry or unsatisfied, than reported elsewhere (Hellings & Howe 2000; Cantrill, Creedy & Cooke 2003b). American physicians’ knowledge (Freed et al 1995) was found to be similar or inferior to Australian paediatric nurses. Few participants reported they would advise a mother to cease breastfeeding if her infant had an infection. Knowledge of the
evidence related to the hydration and breastfeeding requirements of a sick breastfed infant is of particular importance to paediatric nurses.

A small but significant proportion of participants (25%) indicated that they would recommend ceasing breastfeeding in response to maternal fatigue. Fatigue has been well substantiated as usual in the postpartum period up to and including twelve weeks of age. Interrupted sleep and tiredness are common when caring for infants and young children (Hill et al 2005; Lee & Lee 2007; Runquist 2007), thus weaning is an inappropriate response. In optimal circumstances, in the presence of illness or injury breastfeeding should continue to allow the diverse immunological elements to enhance protection from infective and foreign agents (Oddy 2002; Spatz 2006) while infants are hospitalised (Oddy 2002; Leung & Sauve 2005; Rodriguez, Miracle & Meier 2005).

Participants in this study demonstrated limited knowledge relating to skin-to-skin contact, but recognised the need for support of the breastfeeding mother to successfully breastfeed. Cantrill, Creedy and Cooke (2004) found that 82% of midwives knew that skin-to-skin contact improved mothers’ acceptance of their newborn. Knowledge of skin-to-skin care investigated in paediatric nurses has not been previously researched. Given the many studies, including a systematic review, which have demonstrated positive association between skin-to-skin and breastfeeding outcomes, especially for ill and vulnerable infants (Cantrill, Creedy & Cooke 2004; Feldman 2004; Spatz 2006; Moore, Anderson & Bergman 2007; Crenshaw 2007; McInnes & Chambers 2008), knowledge of skin-to-skin was identified as essential knowledge.

The daily nutritional and fluid requirements of breastfeeding women are similar to all women (Biancuzzo 2003). Participants gained higher knowledge scores for this compared to dieticians and nutritionists (Payne et al 2007), other Australian paediatric nurse samples (Karipis & Spicer 1999) and Australian GP registrars (Brodribb et al 2008). Maintaining good nutrition is important for breastfeeding mothers when infants and children have been hospitalised but the cost of meals can exceed $30 per day if not provided (Shields & Tanner 2004, Siffleet, Munns & Shields 2010), presenting barriers to breastfeeding mothers. This added financial stress has the potential to impact on the physiology of lactation.

Breastmilk expression is important to the maintenance of breastmilk synthesis when the infant is unable to breastfeed (Spatz 2005; Donovan & Buchanan 2006; Myers & McDowell 2007; Wenner 2007). It should be as frequent as the infant’s normal feeding times to maintain breastmilk production. Over half of participants agreed that when a baby is hospitalised, mothers can express whenever ‘they feel like it’ in a 24 hour period. Yet, many agreed that mothers should express at the infant’s normal feeding times when the infant is NBM. These results are similar to other Australian paediatric nurse samples (Karipis & Spicer 1999). This controversy indicates that strategies may need to be implemented to clarify expressing regimes for mothers with infants who are fasting or unable to breastfeed.

Although it has been established that breastfeeding provides analgesic relief for infants before, during and after painful procedures (Gray et al 2002; Shah, Aliwalas & Shah 2006; Codipietro, Ceccarelli & Ponzone 2008), no studies to date have enquired about nurses or other healthcare professionals’ knowledge relating to this. Van Hulle Vincent (2005) surveyed nurses about paediatric pain relief and almost all participants agreed (98.5%) that non pharmacological methods should be encouraged which would include breastfeeding. Paediatric nurses in the present study were unaware that breastfeeding can provide pain relief for infants. Very few were aware that breastmilk reduces the risk of pneumonia beyond six months of age. Recent research has recognised that breastfeeding reduces the risk of pneumonia and lower respiratory tract infection (Chantry, Howard & Auinger 2006), while length of hospitalisation for infants with these health issues is reduced for breastfed infants (Quigley, Kelly, & Sacker 2009; Tiewsoh, et al 2009).

**Knowledge in Relation to State, National and International Policies and Recommendations**

Knowledge of local, national and international policies, protocols and recommendations was generally very poor. Few had heard of the BFHI and the Ten Steps to Successful Breastfeeding, yet indicated that the Ten Steps to Successful Breastfeeding deter the use of infant formulas. Mizuno et al (2006) found similar results with 38% of paediatricians and obstetricians having heard of the WHO International Code of Breast Milk Substitutes. A third of participants knew that the International Code of Breast Milk Substitutes does not permit hospitals to give out free samples of infant formula which is better than Japanese doctors (Mizuno et al 2006), with only 14% responding correctly. Forty percent of participants were aware of the association that exclusive breastfeeding may reduce the risk of sudden infant death, yet similar numbers were unsure. The NHMRC’s Infant Feeding Guidelines for Health Professionals was not well known, yet just over a third knew where they could obtain a copy. These results indicate that paediatric nurses may be aware of available resources, but do not have the time to pursue them. Limited participants knew that the Queensland Government’s Optimal Infant Nutrition was not a guideline for parents when it is the state policy and guidelines for infant nutrition for healthcare professionals. In comparison, in a study of Australian student dieticians and nutritionists, 84% knew that Australia has a National Breastfeeding Strategy (Payne et al 2007).

Queensland Health, the NHMRC and WHO all recommend exclusive breastfeeding to six months of age (Kramer & Kakuma 2002; Queensland Health 2003; NHMRC 2003; WHO & UNICEF 2003; WHO 2011a, 2011b). Most participants knew this but few were aware that the WHO recommends breastfeeding beyond two years of age (Kramer & Kakuma 2002; WHO 2011b; WHO & UNICEF 2003). This suggests that paediatric nurses have good knowledge of initial breastfeeding practices, but less once solids and other complimentary foods are commenced. Although these results are disappointing, they surpass those of breastfeeding support staff in England, where barely 10% of midwives, health visitors and volunteers knew the WHO recommendations for exclusive breastfeeding (Wallace & Kosmala-Anderson 2007). No previous research has investigated...
Australian healthcare professionals’ knowledge of local, national and international policies, protocols and recommendations concerning breastfeeding at the time this survey was distributed.

**Attitudes of Paediatric Nurses**

Participants generally had a positive attitude towards breastfeeding, corresponding with the attitudes of Australian doctors (Brodribb et al 2008) and the majority believed that breastfeeding was best for infants and that mothers should be encouraged to breastfeed. Few reported that they were uncomfortable seeing a mother breastfeed in public and a few were uncertain. These results are similar to those of other Australian healthcare professionals (Payne et al 2007; Brodribb et al 2008) whereas two studies of nursing students in the USA found that large numbers of students believed that mothers should not breastfeed in public places and that this was due to societal views (Spear 2006; Cricco-Lizza 2006). It could be related to community wide support for breastfeeding in public places as this study, in addition to previous studies (Payne et al 2007; Brodribb et al 2008) have all comprised Australian participants and were similarly comfortable with mothers breastfeeding in public. Participants were divided on how they believed mothers felt about breastfeeding in public places. Breastfeeding mothers may feel uncomfortable and self-conscious (Hailes & Wellard 2000; Luxner 2005) breastfeeding in public places however the positive attitude indicated by paediatric nurses could alleviate some of the possible self-consciousness of mothers in hospital.

Partners were believed to be important to the success of breastfeeding. This concurs with other studies (Rempel & Rempel 2004; Li et al 2004; Scott et al 2006; Paul et al 2007). Beliefs of partners predict the intentions and initiation of breastfeeding (Rempel & Rempel 2004). Previous studies have not reported attitudes in relation to children observing breastfeeding. Nine out of ten paediatric nurses agreed that it should be a part of childhood. This result could possibly be related to the acceptance of breastfeeding in public. These results are promising, as previous research has indicated exposure to breastfeeding enhances the likelihood of a positive decision to breastfeed when children grow up and become parents (Leffler 2000; Juliff, Downie & Rapley 2007).

Although some participants felt that breastfeeding should be discrete few thought it was necessary to be behind closed doors corresponding with a study of USA nursing students (Spear 2006). A number of paediatric nurses did not believe that breastfeeding a child should continue beyond two years of age. No other research has investigated the attitudes of nurses and other healthcare professionals regarding this assertion. This attitude raises the possibility that paediatric nurses may not be supportive of the breastfeeding mother whose child is older. It is encouraging to find that although some paediatric nurses did not believe that they had the knowledge to assist breastfeeding mothers, the majority recognised that mothers need practical and emotional support (Pantazi, Jaeger & Lawson 1998; Sikorski et al 2003; Ebersold et al 2007; Shechan, Schmied & Barclay, 2009). Many knew where to obtain information for professionals and consumers but a few understood that information and support available from the ABA is for healthcare professionals as well as breastfeeding mothers. This corresponds with a study of how Australian midwives obtain breastfeeding knowledge, in which just over 2% stated that they rated the ABA as a valuable resource for knowledge (Cantrill, Creedy & Cooke 2003a).

Participants employed in the community demonstrated better knowledge across all areas compared to those employed in other paediatric settings. It could be assumed that this is due to further study and the increased contact that these nurses may have with breastfeeding mother – infant dyads.

**Study Strengths and Limitations**

The study has identified areas of excellent, good and poor knowledge and attitudes, some of which had never been reported for nurses or other healthcare professionals previously. These results have the potential to inform policy and training initiatives now and in the future. However, there are some considerations to be made when appraising these results. The participants were from only two different settings and may have been biased towards those that have an interest in breastfeeding generally as only 53% of identified participants responded. The study was limited to nurses’ knowledge and attitudes. It was not possible to examine the influence of training on knowledge, attitudes or practice.

**Conclusion**

Findings reported indicate that paediatric nurses do understand that breastfeeding is best for both the mother and child, but they may be unsure about the physiology of lactation and attachment. They may be uncertain about how to support the breastfeeding mother of a sick, hospitalised infant. Knowledge deficits have been identified in important areas related to common breastfeeding problems, attachment, maintenance of milk supply, expressing, impact of supplements (fluid or formula), protective benefits and supportive advice and strategies. These could make the difference between continued breastfeeding while infants and children are hospitalised, the recovery of ill and injured children, and may have the potential to impact negatively on appropriate support provided to breastfeeding mothers. Very few participants were aware of local, national and international policies, protocols and recommendations. The need for development of effective strategies to disseminate changes in policy, protocols and recommendations and the development of education and reference material specifically aimed at improving nursing knowledge and skills regarding support breastfeeding mothers of sick, hospitalised infants is supported.

**ACKNOWLEDGEMENTS**

The authors would like to thank the Royal Children’s Hospital Foundation for providing research funds through the Nursing Research Skills Development Scholarship, participating paediatric nurses and principal authors of previous breastfeeding research, Gary Freed, Pam Hellings, Ruth Cantrill, Hila Spear and Tim Lowe, for allowing the incorporation of their questionnaires.
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