

Original Article

Infant feeding in the neonatal unit

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Abstract

Infants admitted to a neonatal unit (NNU) are frequently unable to feed by breast or bottle because of ill health or prematurity. These infants require nutritional support until they can start oral feeding. Breastfeeding is advocated for these infants, and mothers are frequently encouraged to express breast milk to be fed via the enteral tube. However, by discharge, breastfeeding rates tend to be low. Oral feeding requires careful management, and although practices may vary because of clinical need, some may be informed by unit norms. There is limited evidence for effective breastfeeding support in this environment and little exploration of the effect of routine feeding decisions. This study aimed to explore feeding decisions and considered how these might affect outcomes. The staff in the two large urban NNUs who participated in the feeding decisions were interviewed and the data were analysed using a theoretical framework. Feeding decisions were made mainly by the unit staff, with limited parental involvement. Subsequent management varied, with differences being related to staff experience and beliefs, unit norms, parent's expectations and physical constraints within the unit. The staff were overtly supportive of breastfeeding, but the need to monitor and quantify milk intake may undermine breastfeeding. Furthermore, feeding breastfed infants during the mothers' absence was controversial and provoked debate. There is a need for clear guidelines and increased parental involvement in feeding decisions. Routine practices within the system may discourage mothers from initiating and persisting with breastfeeding. A change in unit culture is required to fully support the parent's feeding choices.

Keywords: infant feeding, breastfeeding support, neonatal unit, health professional, preterm infants, decision making.

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Introduction

Preterm or sick babies are regularly admitted to neonatal units (NNUs) following birth. On admission, many are unable to feed by breast or bottle because of either ill health or prematurity. These infants will therefore be fed by other means, including enteral tube feeding (nasogastric or orogastric), until they are able to start oral feeding (breast,

bottle or cup). During this time, the mothers of babies in an NNU are frequently encouraged to express breast milk to be given to their infant via enteral tube. Breast milk confers benefits for sick or preterm infants (American Academy of Pediatrics 2005), including anti-infective agents and important growth factors (Schanler *et al.* 1999; Edmond & Bahl 2006). It is also more easily digested than breast milk substitutes, and many of the nutrients are more

bio-available (Schanler *et al.* 1999; Ward-Platt & Deshpande 2006).

Once the infant is ready to start oral feeding, the transition requires careful management to ensure the infant receives adequate nutrition, avoids the development of feeding difficulties such as feeding aversion and enables timely discharge home. Because of the potentially large number of staff involved in the care of these infants, clear consistent management will avoid both the infant and the parents being exposed to conflicting practices. However, the evidence used to inform decisions regarding the initiation, management and evaluation of oral feeding has been found to be inconsistent (Daley & Kennedy 2000). Although management will vary according to the clinical needs of the infant, some of the variations in practice may be related to unit norms and staff personal beliefs (Hurst 2001). Furthermore, it is not clear from published research who makes these decisions or what role the parents have. Once babies can feed normally (oral feeding), breastfeeding is recognized as the optimal method (Edmond & Bahl 2006) and breastfed preterm infants appear more physiological stable than bottle-fed preterm infants (Blaymore Bier *et al.* 1997; Marinelli *et al.* 2001; Buckley & Charles 2006). Infants who are breastfed are also more likely to receive breast milk for longer than infants who are fed expressed breast milk by bottle and/or by cup. There is good evidence that mothers of sick or preterm infants will express breast milk, but few infants are breastfed at discharge from the NNU (Buckley & Charles 2006; McInnes *et al.* 2008). The initiation and duration of breastfeeding may in part be adversely affected by the complex clinical needs of sick or preterm infants, but the lack of breastfeeding may also be because the transition to breastfeeding is not managed optimally. This may be due to the lack of

clarity in the judgements and decisions around the transition to oral feeding.

The aim of this study is therefore to map the judgements and decisions that are made around the transition from tube feeding/IV feeding to breastfeeding/bottle feeding, to clarify the roles of those involved including the staff and parents, and to compare the processes involved in the transition to breastfeeding and to bottle feeding.

Methods

Location

This study was based in two large, Level III, urban NNUs located within the maternity units of two university teaching hospitals. Both units were composed of facilities for neonatal intensive care (NICU), high dependency (HDU) and special care. One of the units provided 'rooming-in' facilities for parents to stay overnight. The demographic profiles of the local populations of each unit differed, with one unit being located in a particularly disadvantaged urban area; however, both units also received infants from other areas of the UK. These units were selected because the demographic profiles may offer different perspectives on infant feeding and both units were part of UNICEF Baby Friendly-accredited maternity units.

Recruitment

Access was arranged via the senior midwife in charge of the unit, and posters outlining the study were posted on the unit notice boards. Written information and consent forms were mailed or hand-delivered to 99 individual staff members listed on the staff rota. In order to explore infant feeding in this environment,

Key messages

- Management of infant feeding was related to staff experience and beliefs, unit norms, parent's expectations, and physical constraints within the unit.
- Parental involvement in feeding decisions was limited.
- Although the staff were overtly supportive of breastfeeding, routine practices within the system may discourage mothers from initiating and persisting with breastfeeding.

we used systematic non-probabilistic sampling to include a range of informants who may use different sources of knowledge and have varying influences on infant feeding (Mays & Pope 1995). The sample was stratified to represent the relative numbers of health professional groups that had been identified in prior discussions with the staff as potentially having a role in infant-feeding decisions in the NNU. The target sample for each group was determined by the relative size of each discipline within the units. We then used opportunistic sampling to recruit midwives and nurses who were on duty at the time of the researchers' visit to the NNU. Health professionals from the smaller professional groups (paediatricians, speech and language therapists, and the infant feeding advisor) were purposively invited to participate by virtue of their professional group. One health professional later declined to participate.

Sample

The sample of 21 health professionals was composed of eight neonatal midwives, five midwives, three nurses, two paediatricians, two speech and language therapists, and one infant feeding advisor. It was acknowledged that professional involvement will vary, but at the outset, it was unclear as to who had influence in various decisions.

Data gathering

A semi-structured data collection tool was used to ensure key questions were addressed. This used a combination of critical incident technique (CIT) and prompts. CIT has been used for analysing the complex factors related to the delivery of care (Kemppainen 2000) and was first defined by John Flanagan (1954), who described it as a procedure for gathering certain important facts concerning behaviour in defined situations. He also emphasized that it did 'not consist of a single rigid set of rules governing such data collection [but] should be a flexible set of principles which must be modified and adapted to meet specific situations'. CIT has been used to study the quality of health-care provision within the clinical setting by encouraging the interviewee to think of a

particular incident or patient in order to elicit factors that might lead to making a decision regarding care management (Kemppainen 2000). This technique has been used in evaluating nursing care (Kemppainen 2000; Narayanasamy & Owens 2001), and following the discussions among the research team, it seemed an appropriate tool for exploring initial infant feeding decisions in the NNU. For the purpose of this study, the interview schedule was developed from informal discussions with the neonatal staff and from the literature surrounding the assessment of feeding readiness and management of infant feeding in the NNU. To determine the cues or factors that led the carer to start oral feeding, the participants were asked to think about an infant they had looked after who had seemed ready to begin oral feeding and to describe the judgement they made about whether oral feeding was appropriate and subsequent decisions. Thinking about a specific infant would more likely elicit actual practice rather than a theoretical answer of what the staff thought should happen, although it is likely that the health care professional (HCP) would draw on their experiences of managing several different infants. The participants were then asked if they could rank any of the factors or cues in order of importance, i.e. the most important factor that led them to implement oral feeding. Finally, the participants were asked if any other factors might influence the decision to start oral feeding (if no response was given, the interviewee was prompted to think about the wider clinical and social environment, such as events in the nursery, staffing or influences from the parents). These same questions were then asked with the participants thinking about an infant they had cared for who did not appear ready to feed and an infant where they had felt unsure if he or she was ready to feed. The responses to these questions identified the factors in the decision to start oral feeding and by comparing responses according to different scenarios, clarified the cues used by the staff in this decision. To determine who participated in the feeding decisions, the interviewees were asked who they considered to be the main person to make the decision and if anyone else may be involved (again if no response was given, the interviewee was prompted to think about the parents or other health professionals). Asking this

question to all the participants served to verify the responses across the health professional groups. The staff were then asked to describe how feeding would be managed for each scenario (ready to feed/not ready to feed/readiness unclear). At the end of the interview, the participants were invited to comment freely on their experiences of feeding management and on what they thought made the transition to oral feeding and to breastfeeding successful. The interviewer also used this opportunity to explore any issues raised in this or in previous interviews. All interviews, which were audio-recorded and transcribed professionally, took place between May 2007 and August 2007 and lasted between 30 and 50 min.

Data analysis

Data analysis used a theoretical framework derived from the questions implicit in the study aims and addressed in the interview schedule (Pope *et al.* 2000). The first author read each interview transcript in full and listened to the audio files in order to become familiar with the subject and ensure that the meaning was correctly interpreted. Data from each transcript were then arranged into charts according to the decision points, which led to a change in feeding management. Each decision was then explored to determine the cues or influences that led the staff to change management, participation in feeding decisions and the evaluation of management or progress. Additional topics or issues that had been raised during the interview were grouped by theme and themes across interviews explored.

Bias

As the first author has previously been involved in promoting breastfeeding, it was anticipated that this may preclude an unbiased exploration of processes. Therefore, a particular effort was made to explain to the participants that this study was about infant feeding in general and decision-making in particular with no emphasis on any type of feeding. In order to reduce possible bias during analysis, a random selection of transcripts were coded by the second author. Both authors then compared how each paper had

been coded and agreement was noted to be high. Where opinion differed, a consensus was reached following discussion by both authors. The initial findings were also fed back verbally in a discussion session with the mothers and staff in one of the units. The mothers in particular stated that our findings resonated with their own experience.

Ethics

The NHS Research Ethics Committee was approached for ethical approval before conducting this study; however, as the study did not involve patients and did not include an intervention, they determined that an ethical review by them was not required. We therefore obtained ethical approval from the ethics committee of the Department of Nursing and Midwifery, University of Stirling. The participants were given written information about the study in advance of the interview and a written consent was obtained from all the participants. To maintain confidentiality, participant quotes have been given a numerical code. Because of the small sample, the participants can not be identified by professional group.

Findings

The results will be presented according to the two main decisions identified, i.e. the decision to start oral feeding and the management of the transition to oral feeding. For each of these decisions, we will explore influencing factors, participation and evaluation. In addition, we have compared the management of the transition to bottle feeding and breastfeeding. Similarities and comparisons will also be made between the units and between the participants. Participant quotes will be used to illustrate the key points in each section.

The decision to start oral feeding

Influences

Assessing the readiness to start oral feeding appeared to be carried out informally by the midwifery/nursing staff caring for each infant. Most of the participants

felt they were able to identify the factors/clues that determined that the infant was ready to start oral feeding, although the relative importance of factors varied from person to person. The majority of the staff based their decision on the baby's behaviour, describing babies that were ready to feed as 'looking for a feed' or 'looking hungry'. This appeared to encompass rooting or sucking fingers, tubes or dummies (pacifiers).

Basically they're looking for their feeds. Sometimes you'll find when you're tubing a baby, it gets quite, annoyed, that it's looking to suck, it's wee mouth moving, . . . it's wanting to suck its feeds (12).

Being alert or waking around feed time was also a major factor, and for some, knowing that the baby was safe to feed (i.e. 'would not have an incident', choke or desaturate) was important. The age or gestation of the infant appeared less important than the behavioural cues except in the absence of behavioural signs where gestational age became more important. The majority of the staff believed that oral feeding should have started by about 32 weeks to 35 weeks. Variations in assessing readiness to feed with regard to the mothers' choice of feeding was mentioned infrequently: one HCP said that breastfeeding may begin earlier as it was safer than bottle feeding and there was one description of the infant's attempts to latch onto the breast as a sign of being ready to feed.

Or if the baby's out, [of the incubator] particularly if mum's gonna breastfeed the baby, if the baby was rooting to suck into the breast, we would maybe allow the baby to have a wee kinda lick round about and see how that would go (13).

Other influences on the decision to start oral feeding included staff experience, both of caring for neonates and of 'knowing' the individual baby and competing demands from elsewhere in the unit.

Participation

The decision to start oral feeding was made jointly by the midwifery/nursing and medical staff, with most describing it as mainly a midwifery/nursing decision, although some suggested that it would depend on personality and experience. Professional experience

was important, with some senior midwifery staff saying that they would make the decision to initiate oral feeding while the junior staff tended to seek approval or reassurance from another first. Professional experience was composed of a combination of 'knowing the baby', experience gained through working in the NNU and intuition or instinct.

Well, I would say it's the nursing staff that make the decision but I think the medical staff would think it is their decision to make. So I suppose ultimately . . . well, I think it depends on your experience, I have to say (06).

In general, the parents did not appear to have much of an influence as to when oral feeding should start, and most communication with the parents would take place after the decision had been made. Where the mother planned to breastfeed, there was the potential for greater involvement with planning the first oral feed.

I would prefer the mum to be here because . . . you don't want parents to miss out on first events and particularly if she's wanting to breastfeed . . . (20).

Management of the transition to oral feeding

Once the infant commenced oral feeding, there were a number of further decisions regarding timing and frequency of oral feeds, volume of milk required, method of feeding (breast, bottle, cup, syringe) and type of milk (breast, formula, additives). These decisions did not always appear consistent, with differences between and within the units being related to staff experience and beliefs, unit norms, parent's expectations, and physical constraints within the unit. Inconsistencies and contradictions in routine management could result in an infant (and his parents) experiencing a range of practices and management styles from different staff. The main inconsistencies were staff decisions about the timing and frequency of oral feeding, the volume of milk intake and the method of oral feeding.

Timing and frequency of oral feeding

During the transition to oral feeding, there was relatively strict control over feeding times and volumes.

Table 1. Feeding models

Structured/regime (Unit A)	Baby-led (Unit B)
Feeding would be prescribed, e.g. one oral feed a day, one oral feed to two tube feeds etc.	Oral feeds given if behavioural signs were there and infant awake and alert
Emphasis was on sticking to a regime otherwise the infant would become tired and refuse to feed	Emphasis was on the baby being an individual and going at his pace, feeding was dependent on the infants cues
'So I always introduce one suck feed a day and see how they go with that and then build that up to two. [...] and I do tend to try and keep it very structured (06)'. 	'I would take the opportunity to orally feed the baby if it is in an awake state, hungry state . . . it wouldn't matter what time of day or night (20)'.

Most staff described a three-hour feeding regimen (tube or oral) with those nearly ready to go home moving onto four-hour or 'demand' feeding. Within this framework of tightly timed feeds were descriptions of two distinct methods of determining which feeds the infant would have by tube and which would be oral (breast, cup or bottle). The two models are outlined in Table 1.

Although these models have been described as distinct, there were inconsistencies between the staff even within the same unit. Some staff from Unit A (structured) suggested that structured feeding was 'too strict', that it was important to 'use your discretion' and/or individualize care based on previous experience. The staff in Unit B (baby-led) argued that structured feeding was helpful for inexperienced staff and also prevented the infant from becoming tired. Some of the HCPs viewed both models as a guide and might incorporate both into feeding management.

There was some evidence that the staff would save oral feeding for when the parents were expected to be present in the unit, but this was not consistently applied. Indeed, some staff suggested that in some instances, parents should not be involved in the early or first feeds since they lacked experience.

... and sometimes you just have to say ... 'no, we have to try them' ... we're very encouraging parents but is it the right place to let the parents try them for the first time? ... because a lot of the parents, it's a learning experience for them. They've perhaps never fed a baby and there is ... I won't say a knack but there is a way of doing things [05].

Feed volumes

During the transition to oral feeding, daily milk requirements were prescribed according to the unit

protocol, i.e. calculated according to weight and age and increased each day according to weight, weight gain, age and previous intake. This volume would be divided into six or eight equal amounts depending on whether the infant was being fed every 3 h or 4 h. At each oral feed, the infant was encouraged to ingest this amount. At the end of the feed, any milk remaining from the prescribed volume would be given to the infant via nasogastric tube as a 'top up'. The source of the information used for the calculation of feed volumes was not clear and it is possible that they might no longer be appropriate.

I think we overfeed lots of babies in the first few days. I think, ... yeah, there's that problem about not being hungry, ... we have prescribed volumes which are way ahead ... dear God knows where the prescribed volumes came from ... (21).

Several of the staff voiced concerns regarding the three-hour feeds and large prescribed feed volumes stating that some infants were being overfed sometimes to the point of being sick. The staff suggested that the large volumes coupled with frequent feeds may prevent the infant from becoming hungry, slow down the transition to oral feeding and make breastfeeding, in particular, more difficult.

... and I think they also don't get hungry because they have these regimented feeding, every 3 hours ... the babies are never hungry enough to actually feed (02).

Volumes were prescribed regardless of the mother's chosen method of feeding, thus, achieving the required daily volume for a breastfed infant became complex and dependent on individual beliefs. The HCPs also voiced concerns that the continual increase in prescribed milk volumes was an added

pressure for mothers trying to express breast milk in an already difficult situation and that mixing breast milk with large (and increasing) quantities of formula may be demoralizing for mothers, particularly those with 'inadequate' supply.

... that can be discouraging to some mums when they think the baby's only getting a quarter of her milk and three quarters of something else (02).

Method of feeding

For mothers wanting to breastfeed, there was an additional decision of how her infant should be fed during her absence from the unit. All of the HCPs interviewed were clear that this decision was the mother's, that the mothers 'made an informed choice' and that the staff would do whatever the mother had 'consented to'. Cup feeding was advised in the infant-feeding policy of both units, but while the HCPs in Unit A advocated cup feeding, tube feeding appeared to be the norm in Unit B. Neither unit encouraged the use of bottles, and bottle feeds were only given 'with the mother's consent'. However, the practice varied within and between the units and appeared controversial, giving rise to some of the strongest comments from the staff. To highlight the varying opinions and beliefs, the key comments about cup feeding have been listed in Table 2. The majority of the HCPs interviewed stated that it made no difference how the baby was fed; three suggested that cup feeding may even be harmful for the development of the infant's suck, and only four believed that cup feeding may benefit breastfeeding. Given that the majority of the HCPs interviewed disliked cup feeding and did not perceive any benefit from it, it was not clear how the mother was informed of the risks and benefits of the choice. Some of the HCPs said that the mothers would be given information on the use of bottles or cups and asked to make an 'informed choice'; however, others suggested that it was more likely that she would be encouraged to allow her baby to be bottle-fed.

It depends quite a lot on the staff actually, ... it seems to me that quite often the mum is asked, does she mind if the baby has a bottle [...] I'm not sure how that phrase is put ... I think it's put such that most mothers agree, ... (21).

Evaluation of progress

Considering the overall aim of feeding management was for the infant to take all feeds orally, progress was indicated by an increased proportion of oral feeding and less dependency on nutritional support such as tube feeding and 'top-ups' (additional tube feeding following a bottle feed or breastfeed). In general, the staff described a successful feed as where the infant had managed to take the full prescribed volume by herself or himself. Thus, success was the intake of a measurable and visible volume of milk.

If you get to the stage that this baby is sucking 5 mls every feed and just not getting anywhere, you would consider this baby's not ready to feed yet [...] because you're just ... tiring it out if it's not actually succeeding (20).

Since measuring actual milk intake was not possible for the breastfed infant, intake and the need for a 'top-up' would be judged according to whether the HCP thought that the infant had a 'good' breastfeed (or the mother's opinion would be sought). This included assessing breastfeeding technique, assessing the mother's breasts and/or counting how often the infant was being breastfed. Some recommended that techniques for accurately monitoring intake, such as test weighing, be developed, but this method did not seem acceptable to all the staff members. If a top-up was required, the HCPs interviewed were unable to give a clear and consistent decision on how they would work out the volume of additional milk required.

I think we normally go by ... if the mum's only doing it [BF] once a day and she has got a lot of milk and she feels as if the baby's fed really well ... and the baby's really looks full, we maybe wouldn't top up because it's once a day. If it was breastfeeding quite a lot, like if it was alternate and we felt it wasnae ... we'd say, well we don't want to have the baby short, then you could top it up by half the feed (18).

Weight gain was also an important indicator of success and was used frequently to adjust decisions regarding feed volume and frequency. However, some midwifery/nursing staff expressed concerns that this was overemphasized, particularly by the medical staff. Although some of the HCPs employed more holistic

Table 2. Cups, bottles and nipple teat confusion

		Comments	Source
Cups, bottles and nipple teat confusion	Nipple teat confusion does not exist.	Most staff did not believe in any nipple teat confusion. I mean, giving them a bottle doesn't make them that they won't breastfeed [08] My personal view is . . . no. I don't think it makes a difference . . . , years and years ago, we didnae cup-feed and babies were bottle-feeding and went home breastfeeding. [18]	01, 02, 04, 05, 06, 07, 08, 09, 13, 14, 16, 18
	Nipple teat confusion may exist.	Some infants may get confused, and cup feeding, which is thought to be more similar to breastfeeding, may be helpful. I would probably say cup-feeding does [make a difference], because it's a different muscle structure that the babies are using for the breast and to be bottle-fed with teats. I would say it [cup feeding] does help them to lap more, which is the instinctive of what they do with breastfeeding . . . [10]	10, 14, 21
	Nipple teat confusion exists but is caused by cup feeding.	Some thought that the infant may get more confused through cup feeding and that bottles may be beneficial for the breastfed infant. I've also cup-fed babies and they've tried to get the whole cup in their mouth because they expect to have something in their mouth and I personally feel sometimes they look like they're getting more confused. [20] Some babies will go on quicker to the breast, some . . . you can get them going by giving them a bottle and getting them used to sucking, then they'll go on to the breast. [05]	05, 06, 15, 20
Psychological effect on mother of bottle feeding	Some staff spoke of the risk of seeing baby bottle feeding.	It is not the sucking action that matters but the psychological impact of seeing her infant sucking large volumes of milk by a bottle, and seeing bottle feeding as clean and/or easy that could undermine breastfeeding. Eg And I do think it is very easy for mums to see that a baby empties a bottle very, very quickly and they become quite obsessed with . . . 'oh, I can see the volume my baby's taking and I can't see that maybe if he's breastfeeding'. [06]	01, 06, 12, 21
Cup feeding	Cup feeding as messy, wasteful and risky	The vast majority of comments about cup feeding related to it being messy, wasteful of EBM and causing problems with calculating feeds and top-ups. Most of the staff did not like doing it for this reason and some also commented that it was time consuming. For a minority the risk of aspiration and/or choking was uppermost. My own personal feeling is cup-feeding's a bit messy and it depends on the person doing it as well, em and you quite often can't always gauge how much they're getting because you lose a lot of milk [07] Well cup-feeding is getting pushed but I think if it's done by an inexperienced person, you . . . you could go on to get aspiration . . . [05]	01, 04, 05, 07, 08, 09, 13, 14, 15, 16, 17, 21
Who should be cup-fed?	It was not clear which babies should be cup-fed.	Some of the staff suggested that cups should only be used with older preterm infants, term infants or for all preterm infants but that sometimes, preterm infants were not very good at it. She's still premature I think she's 34 weeks, she'll be maybe 35 now, so she'll still be classed as premature and I think they only cup-feed babies when they're term [12]	12, 13, 15, 18

EBM, expressed breast milk.

assessments of overall infant well-being, outputs and behaviour, it appeared that infant growth (and weight gain in particular) was one of the overarching indicators of a successful feeding.

Discussion

Our study did not identify any formal process for determining if an infant was ready to begin oral feeding. This is consistent with an American survey that identified a lack of specific written guidelines for initiating bottle feeding in more than half the NNUs surveyed (McGrath & Braescu 2004). In our study, as in the published review (McGrath & Braescu 2004), behaviour cues such as mouthing, rooting and sucking, and infant alertness were identified as being key indicators of feeding readiness. The accuracy of this method of assessment has not been established, with some published studies showing associations between such feeding behaviour cues and feeding efficiency in bottle-fed infants (White-Traut *et al.* 2005) and others identifying the importance of gestational age and/or state of wakefulness (Bu'Lock *et al.* 1990; Pickler *et al.* 2005, 2006; Gewolb & Vice 2006). It is highly likely that the three factors (behavioural cues, gestational age and state of wakefulness) are interrelated, and this may be reflected in the views of the staff in our study who considered gestational age to be important only if feeding or behavioural cues were not apparent. The health professionals interviewed in our study also highlighted the importance of professional experience when making the decision to start oral feeding. McGrath & Braescu (2004) suggested that while decisions were often intuitive and based on individual carer perspectives, they may not take into account the full range of physiologic and behavioural variables that could influence successful feeding outcomes. McGrath & Braescu (2004) also identified that offering oral feeding when an infant is not ready can have physiological consequences and long-term effects, such as feeding difficulties after discharge, and suggested that this may affect the mother–infant relationship. Algorithms or assessment tools to assess feeding readiness may support a systematic and consistent assessment. However, a recent review of neonatal feeding assessment tools showed

that of the seven scales developed, none had satisfactory psychometric properties (Howe *et al.* 2008).

Variations in feeding management were identified in our study, but because ultimately, the majority of infants are feeding effectively at discharge, it is important to consider whether inconsistent management matters. Over half of the HCPs interviewed in our study emphasized the importance of individualized care. However, the interaction of an individual HCP's own beliefs and external influences from the unit environment suggest that rather than being individualized to the infant, the management was individualized to the individual HCP at a given time. Differing staff views and practices may be problematical for feeding management especially for many of the junior staff, but it also may be frustrating for parents. Indeed, studies exploring parents' experiences of having an infant in the NNU highlight the stress caused by staff taking different approaches to care (Hurst 2001) and the distress caused by finding that their infant has already been attended to or fed just prior to a pre-planned visit (Lupton & Fenwick 2001).

Despite infant feeding being an area of potential parental involvement, the lack of inclusion in feeding decisions was apparent in our interviews. A number of published papers have highlighted parents' frustration in the care of their infant, including their lack of involvement in decisions and a sense of disempowerment in their relationship with staff (Hurst 2001; Lupton & Fenwick 2001; Nyström & Axelsson 2002). The staff in the NNU have been shown to have strong views about care management and how parents should behave, believing that the HCPs should retain control (or protection) of the infant by virtue of their expert knowledge (Lupton & Fenwick 2001). This conflicts with the aim of mothers of hospitalized newborn infants to construct themselves as 'real mothers' by forming a connection with their infant and attempting to normalize their infant (Lupton & Fenwick 2001). As most mothers of healthy/term infants make their own decisions about feeding, then the mother of the hospitalized infant should therefore be a key participant in these decisions. Maternal self-efficacy, being related to feelings of competency and a perception of being able to care for and understand her infant, is recognized as being difficult for mothers

of sick or preterm infants (Hall *et al.* 2002), and many mothers also struggled to manage feeding following discharge home (Reyna *et al.* 2006). The lack of opportunity to be involved in care may result in poor maternal self-efficacy, and it is worth considering whether greater involvement in feeding management decisions would increase maternal self-efficacy.

Evaluating the feeding progress in terms of measuring and monitoring milk intake worked well for the bottle-fed infant but became difficult for the breastfed infant. In our study, some of the HCPs described trying to adapt a quantifiable and visible framework of assessment and management to fit the breastfed infant. Sick, small or preterm infants frequently require assistance with achieving good nutrition, and thus, it is necessary to ensure adequate intake. However, there is currently no acceptable and reliable method of measuring intake for the breastfed infant. Published research has shown that judging the volume of breast milk transferred by observing a feed was not accurate (Meier *et al.* 1996). Test-weighing is thought to measure milk intake accurately (Meier & Engstrom 2007), reassure both staff and parents, and enable accurate calculation of top-up requirements but was not acceptable to many of the HCPs interviewed in this study and in post-study discussions. Tools to evaluate the effectiveness of breastfeeding are still being developed (Chambers & McInnes 2007). We already know mothers of healthy term infants frequently express concerns that their infant is 'not getting enough' (McInnes & Chambers 2006), and such concerns about adequacy of intake may be magnified by mothers when they view their infant as small and vulnerable (Kavanaugh *et al.* 1995). Thus, it might be hypothesized that basing routine feeding decisions on a model of visible and measurable intake may serve to undermine the mother trying to breastfeed her vulnerable infant.

In addition to the difficulties of evaluating progress, the breastfeeding mother also required to choose how her infant should be fed during her absence from the unit. The choice of method should not interfere with the mother's ability to breastfeed but is limited by what is available, e.g. bottle, cup or tube. The evidence of a benefit of one over the other is weak and is mainly predicated on the argument that an infant can

become confused if asked to suck from an artificial teat and then from the breast (Neifert *et al.* 1995). Although the existence of nipple confusion has been disputed (Dowling & Thanattherakul 2001; Flint *et al.* 2007), breastfeeding management aims to avoid artificial teats. Several studies have attempted to explore the impact of avoiding artificial teats on feeding outcomes, but the evidence base remains weak and inconsistent (McInnes & Chambers 2008). The effect of bottle feeding a breastfed infant may be mediated not by the infant becoming 'confused' but rather by the psychological effect of the mother seeing a visible volume of milk being consumed easily by bottle and feeling undermined in her more invisible efforts to nourish her infant. This possibility was raised by the staff during the interviews but has not received any attention in the published literature and is therefore worthy of further exploration. It is important to acknowledge that we do not know how best to feed infants during the mother's absence and must consider the outcomes and safety of the various options currently available.

Limitations

This study was based in two large, busy urban NNUs that served relatively disadvantaged populations. The breastfeeding rate in one of the hospitals was very low, and therefore, it is likely that some of the staff interviewed will have had limited experience of caring for breastfed infants. As their experience was used to inform their responses, it may therefore not be possible to generalize the findings of this study to other units particularly those with different socio-economic demographics and higher breastfeeding rates. Overall, the small sample for this study means that the possibility of selection bias must be acknowledged, and the findings may not be generalized to all NNU settings. The sample was stratified to reflect the relative proportions of health professional groups in each unit, and because of the small numbers in some professional groups, it could be considered that the views represented are their own rather than a consistent view of their professional group. However, given that personal opinion has been identified as an influence in feeding outcome, we believe that this does not diminish our

findings. We would suggest that this study identifies some important issues that are worthy of further exploration in units with different demographic profiles and across different professional groups.

Conclusion

The basis of assessment and decision-making in the management of feeding in the NNU appeared to vary according to unit norms and staff preferences. The resulting inconsistencies in feeding assessment and management suggest a need to develop clear guidelines. Since parental involvement in the management of infant feeding was minimal, this offers a unique opportunity to improve the parents' role in the care of their sick or preterm infant. Although individual HCPs support breastfeeding, breastfeeding is not the norm in the NNUs studied, and routine practice within the unit may act to discourage mothers from initiating and persisting with breastfeeding. Individual interventions are therefore likely to be unhelpful in this environment, and instead, a change in culture within the unit is required.

Acknowledgements

We would like to thank all the staff who participated in this study and both the neonatal units for allowing us access.

Source of funding

This study was funded by the Nursing, Midwifery and Allied Health Professions (NMAHP) Consortium Committee as part of a NMAHP training fellowship.

Conflicts of interest

The authors declare that they have no conflicts of interest.

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