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How do we determine oral readiness in infants?

Abstract:

Determining oral feeding readiness in preterm infants is difficult and involves many aspects, including observations of behavioural state, physiological responses to the environment, oral skills and motor skills. Premature infants are challenged when developing the skills needed for effective oral feeding due to an immature neurological system, underdeveloped motor skills and poor autonomic regulation. Because of an infant's complex needs and immature development, recognizing oral readiness signs alongside other important indicators when planning the introduction of oral feeding can be hard to gauge accurately. This article focuses on nurse practitioner understanding of oral readiness during an informal study completed in an inner city level 1 neonatal unit.

Keywords: *oral readiness; infant responsiveness; feeding; premature infants*

Key points:

- Nurses have significant expertise identifying infant states pre-introduction of oral feeding
- Nurses acknowledge the importance of early non-verbal cues when interpreting an infant's readiness to feed although there is variation in the approaches taken when considering introducing oral feeding
- Describing and identifying infant states remains challenging

Oral readiness is one of the important early stages of infant development when determining oral feeding abilities (1). Sucking ability both non-nutritively and nutritively is often used as an indicator of an infant's oro-motor status and can also be used to give important information about behavioural states (2; 3; 4). Alertness is an important behavioural state often linked to an infant's ability to interact with the environment; this ability to actively focus prior to a motor event has also been linked to later cognitive development (5; 6; 7). Premature infant alertness is different from the alertness of a term infant; in

term infants, the intensity of the sucking is positively correlated with infant responsiveness and the important *quiet alert* state necessary for feeding (4 ; 8). Thus, if the infant is irritable, then sucking is likely to be less consistent and more erratic (9). Greater oral feeding success in premature infants is often associated with the consistent and increased development of the *quiet alert* state (8; 9). Premature infants can achieve the *drowsy* or *quiet alert* state before a feed, but have difficulties in maintaining this because of the other problems they may have due to immaturity, such as weak muscle tone which impacts on a consistent suck-swallow–breathe pattern (8; 10). Feeding is one of the early, routine activities when mothers feel that they are close to their infants and can develop some interaction with them (11 ;12). Interaction can be seriously interrupted if an infant has complex needs, particularly the development of competent feeding, and this can have negative consequences for parent – infant interaction (13). A combination of attributes contribute towards feeding success; one is the gestational age of the infant and his or her stability in relation to motor control, physiologic status and general ability to demonstrate behaviours (5; 8; 14; 15; 16). Stability of the suck-swallow-breathe cycle, along with the ability to demonstrate hunger cues, alertness and good health all contribute to the development of oral readiness for the first oral feed. However, infant states are difficult to identify with premature infants (8; 9). As a result, introducing oral feeding can sometimes be challenging and can interrupt the stable development of the suck-swallow-breathe cycle.

To help support the identification of infant states, some researchers and practitioners have developed checklists that support decision making when considering introducing oral feeding. Thoyre et al (17) also recognize the challenge of identifying oral readiness in relation to an infant's stamina when sucking, oral motor function, physiological stability and coordination of the suck-swallow-breathe cycle. These authors have created a resource to help practitioners to identify core aspects, the Early Feeding Skills Assessment (EFS) (17). This checklist comprises of 32 items used to guide observation, and is described as being "*designed to standardize the measurement of feeding skills of preterm infants*" (p 2). It is uncertain as to whether this can be achieved as the checklist itself relies on interpretation based on experience of

working with neonates, and it only utilizes four of the AIs (18) physiological state descriptors. The combination of signals and signs that contribute to decisions about oral readiness remain ambiguous and not all practitioners who work with infants may be effective in consistently differentiating between all of the identified infant behavioural states (19). Another checklist, Supporting Oral Feeding in Fragile Infants (SOFFI) (20) uses algorithm resources to guide practitioners through decision making about oral readiness. It is specifically for bottle fed, fragile infants. However, although it describes use of non nutritive sucking, pacing and oral states, it is less clear on defining these concepts, and therefore practitioner competence and experience may assist with interpretation. Other, less familiar resources include scales and ratings which are dependent on practitioner experience and knowledge; The Preterm Infant Nipple Feeding Readiness Scale (PINFRS) (21), and an 18 item preterm infant oral feeding instrument (22).

Oral feeding is usually one of the last goals that premature infants need to acquire before being discharged home. However, practitioner skill in identifying core attributes of oral readiness varies despite resources being available (17; 20; 21; 22).In addition, some neonatal units have no specific policies on when to implement oral feeding (23). This informal study explored the key attributes that nursing practitioners consider when developing early feeding skills with premature infants.

Method

Design

A cross sectional informal questionnaire design was carried out during 2013 at a Central London hospital with a Level 1 neonatal unit. The study protocol was approved by the City University London ethics committee. Written consent was obtained from each participant prior to data collection.

Participants

Fifteen nurse practitioners of a range of grades took part. Experience with neonates ranged from 8 months to 27 years, with 7 having worked more than 10 years in neonatal care.

Questions

Participants were asked to comment on the following areas:

- Knowledge of specific policies and protocols about oral readiness
- Knowledge and methods used by the practitioners themselves when determining oral readiness
- Impact of infant health on decision making
- The importance of other factors in the development of oral readiness, e.g. weight, gross motor skills, non-nutritive sucking, etc
- Parent involvement

Results

1. *Knowledge of specific policies and protocols about oral readiness:* None of the participants used any specific, published checklists (17; 19; 20; 21; 22) to inform their decision making about oral readiness. All mentioned some or all the following three key attributes that informed their clinical skills; i) any decision must consider an infant's needs first; ii) hunger cues as well as infant states should be monitored and assessed; iii) tube feeding amounts and tolerance must be evaluated. Three participants did not consider tube feeding tolerance, but these were the three least experienced practitioners. Although participants talked about hunger cues and infant states, no-one described what the key non-verbal attributes were that defined various states. None of the participants used any specific assessments such as the EFS (Thoyre et al, 2005) (17) or SOFFI (Ross & Philbin, 2011) (20), although 13 were aware of them.
2. *Knowledge and methods used by the practitioner themselves when determining oral readiness:* All 15 participants rated non-verbal cues, i.e. infant states, as crucial in determining oral readiness, although none of the participants described specific states. Twelve (all the more experienced practitioners) rated weight, gestational age and parent /carer state as important factors. These same practitioners also mentioned the importance of monitoring amounts taken in feeds when moving towards weaning the infant off tube feeding, e.g. noting when the infant took a minimum of 80% of the feed orally in a 24 hour period (24). Nine considered weight in relation to birth weight, and five

considered weight gain. More specifically, five different participants commented that "weight gain" was different than "actual weight" as there were other variables to consider such as weight at birth and progress with weight. Thirteen participants reported that they would evaluate sucking –swallowing – breathing coordination alongside oral readiness.

3. *Impact of infant health on decision making;* eight practitioners commented that both prematurity and any chronic gut condition such as necrotizing enterocolitis could delay the onset of oral feeding. Other problems included; tongue tie (5 participants); respiratory problems (4 participants); structural malformation, e.g. cleft palate or trachaeomalacia (4 participants); parent social –emotional difficulties (4 participants); infection (2 participants). All participants commented that any or a combination of these factors would impact on the development of infant states, and therefore the infant's ability to develop clear oral readiness signs.
4. *The importance of other factors in the development of oral readiness, e.g. weight, gross motor skills, non-nutritive sucking, etc.* All participants agreed that gross motor skills in the development of feeding. It was interesting to note that "gross motor skills" meant different things to different staff regardless of experience , with practitioners reporting that it included all or some of the following; motor development, muscle tone, posture and oral reflexes. Ten participants commented that posture was not important, but all talked about the importance of muscle tone and oral reflexes as essential clinical indicators to look for.
5. *Parent involvement.* All 15 participants commented on the importance of involving parents in decision making with regard to feeding. Most comments were around supporting parent decisions re: breast, bottle, etc. None of the participants mentioned supporting parents in the identification of infant states as part of their intervention to improve parent-infant bonding and interaction.

Discussion

All participants were aware of key features that are relevant in the development of oral feeding in premature infants such as oral readiness signs, tube feeding amounts and tolerance and improved postural stability. However, although there are some checklists available in the literature, these are not commonly used by participants when making judgments about how to start oral feeding. Participants all agreed that intervention should be infant led and also be dependent upon an infant's health needs. More experienced practitioners talked about specific details when transitioning from tube to oral feeding, e.g. taking 80% minimum for an oral feed over 24 hours (24). What became clear from this informal study was that staff used different vocabulary to mean the same thing, e.g. posture was linked to muscle tone, motor development and oral reflexes by some participants but not others. Although all participants mentioned terms such as "oral readiness", "hunger cues" and "infant states", they were less confident about defining them.

Some authors have stressed that it may be appropriate to formalize steps to support practitioners who work with infants learning to feed orally with evidence based guidelines (23). In addition, a systematic review of evidence did not identify any studies which met the stated inclusion criteria for considering instruments for assessing oral readiness (25). This review concluded that it was unable to determine clearly whether the materials described were of benefit of not, and its authors recommended a need for further studies to explore this. There is variation in the literature about the most suitable infant state for introducing oral feeding. For example, McCain & Garside, 2002; McCain et al, 2001 and Harding et al, 2014 (3; 14; 15) mention that the quiet alert stage is best when initiating oral feeding. However, Pickler et al, (26) comment that infants who were more "active" were better at learning to suck and in the amount of milk taken. It is interesting to speculate that perhaps different practitioners interpret the same states in different ways.

This short study and its findings does not suggest that a rigid protocol be developed. However, learning to read the infant is essential as is training the parents to identify these states when encouraging feeding, and consequently needs greater recognition in the management of early feeding development

(16). Individualized infant care should include both recognition of infant states alongside amounts taken orally and physiological status. Persistent feeding problems with pressure put on carers to complete feeds as well as varying nursing and carer methods of feeding can impact on the development of confident early parenting skills (13 ;16). Further research needs to develop better methods of identifying infant states, and more longitudinal studies of infant feeding will help clarify the range and types of states that could potentially be expected. Framing the communication and interpretation of an infant in a stronger and clearer way cannot be underestimated in terms of positive parent – infant interaction and the development of brain structure (3; 5).

In summary, determining oral feeding readiness in premature infants is a complex task. Further, more in-depth studies that include more rigorous methods of evaluation such as randomized controlled trials, as well as longitudinal studies need to consider what types of resources will help both neonatal practitioners and carers develop appropriate skills in the identification of oral readiness. In addition, further studies could explore the validity of the instruments mentioned (17; 20; 21; 22).

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