

# How to achieve successful preterm breastfeeding

A premature baby's ability to breastfeed can depend on many factors, including medical condition and how early the baby was born. For premature babies, there is usually a step-by-step progress from nasogastric feeding towards established breastfeeding. This article has been written to help healthcare professionals to provide practical guidance to parents about initiating and sustaining preterm breastfeeding underpinned by the understanding of developmental physiology.

## Elizabeth Jones

MPhil RN, RM, ENB 405  
Infant Feeding Advisor, Neonatal Intensive Care Unit, University Hospital of North Staffordshire

## Stephen Andrew Spencer

DM, MRCP, FRCPCH  
Consultant Neonatologist, Neonatal Intensive Care Unit, University Hospital of North Staffordshire

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### Key points

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1. The development of organised suckling patterns is mainly dependent on maturity.
2. Skin-to-skin holding and suckling at the emptied breast is used to promote the maturation of infant breastfeeding behaviours.
3. Observation of infant suckling behaviour is used to initiate oral feeds.
4. The milk ejection reflex must be elicited during breastfeeding to promote the establishment of nutritive suckling.

Preterm birth can affect newborn behaviour in general and breastfeeding in particular. Early delivery presents additional challenges to the mother who wishes to breastfeed, since she must maintain her milk supply for many weeks before feeding can be established. In addition the infant's increased nutritional requirements, along with limited abilities to suckle require specialist breastfeeding management, which may not always be available. Current data suggests that although the initiation rate of preterm breastfeeding is increasing, the duration of breastfeeding is typically shorter than the mothers' initial goals<sup>1</sup>. However, several publications suggest that the rates for exclusive breastfeeding can be improved if breastfeeding programmes are implemented in neonatal units to support the establishment of preterm breastfeeding<sup>(2, 3)</sup>. The aim of this paper is to provide a short overview of the developmental physiology of breastfeeding in the preterm infant followed by the practical steps that are required to successfully initiate and sustain breastfeeding in these infants.

### Feeding development

Sucking, swallowing, gagging and rooting are somatic reflexes associated with breastfeeding. The breastfeeding infant requires not only the ability to suck and swallow, but also the ability to co-ordinate suck and swallow with breathing. Preterm infants do not demonstrate reflexes equivalent to those of a term infant due to their neurological immaturity, abnormal muscle tone and depressed oral reflexes.

The development of oral-motor skills in the preterm infant develops in four distinct phases:

- n Development of sucking
- n Maturation of the swallowing process
- n Maturation of respiration
- n Co-ordination of suck/swallow/breathe

Although sucking components may be present from around 28 weeks' gestation the synchrony is irregular and the infant tires easily. Initially the immature suck/swallow pattern is demonstrated by breaths occurring only during the pauses in feeding. As the infant matures the isolated sucks become more functionally co-ordinated with swallowing and breathing, and gradually become integrated into bursts. The co-ordination of suck and swallow is essential for milk transfer. These mechanisms start to become co-ordinated around 32–36 weeks' gestation, although high-risk infants may not always follow the predicted maturational course. Although there is a strong correlation between maturity and organised suckling patterns<sup>4</sup> there is also evidence that the transition time can be accelerated by exposure to early positive suckling experiences<sup>5</sup>.

### Structure and function

Breastfeeding is accomplished by the intact structure and function of the oral cavity – the lips, cheeks, tongue, hard and soft palates and the jaw. Oral, buccal, lingual and pharyngeal muscles are also directly involved in breastfeeding giving an infant the ability to generate vacuum. These muscles may be too weak following preterm birth to generate negative pressure

and so there will be a delay in an infant's ability both to accomplish and to sustain suckling. In order to establish breastfeeding a preterm infant needs an adequate suckling mechanism, the ability to generate negative pressure and an adequate seal.

Muscles of the head and neck are less involved in breastfeeding, but they do influence breastfeeding success. It is extremely important to note that the preterm head is heavy in relation to the weak musculature of the neck. Unless, a neonate's head and neck is supported with gentle pressure to provide neck stability, undirected head movements can easily collapse the airway, causing apnoea and bradycardia<sup>6</sup>.

Preterm babies have a tendency to adopt an extended position, which may be detrimental to the establishment of feeding. In the term infant, muscles that extend the neck are more developed than those that bring the head forward, requiring the mother to support the head to keep it in alignment with the rest of the infant's body. This head lag is more pronounced in preterm infants due to their weak neck muscles. Poorly developed head and neck muscles can make correct positioning at the breast much more difficult to achieve.

### Bottle versus breastfeeding

Although milk flows at a relatively constant rate during a bottle feed, the rate of flow during breastfeeding is highly variable. In the past, it was commonly believed that breastfeeding was more tiring than bottle feeding. However a recent study in the United States<sup>7</sup> found that preterm infants who served as their own controls for bottle and breastfeeding sessions demonstrated more stable oxygenation patterns during breastfeeding than bottle feeding<sup>7</sup>. This study was subsequently replicated by another group of researchers<sup>8</sup> who found that very low birthweight infants were less likely to have clinically significant oxygen desaturation during breast than bottle feeding. Although the term 'nipple/teat' confusion remains a hypothesis, it has been suggested that if bottles are offered routinely some infants may find it difficult to progress to breastfeeding. The results of the above studies appear to indicate that preterm infants are able to progress directly from tube feeding to breastfeeding without any bottle feeds.

### When to start

Currently, there are few published studies to indicate when a preterm infant should first be put to the breast. In the authors' experience the observation of infant behaviour can be used to determine when to initiate oral feeds. The attainment of a specific gestational age or body weight is not a useful guide. The following points provide guidance for practice:

- n Tolerating bolus feeds
- n Swallowing secretions
- n Physiologic stability
- n Stable respirations (>70 bpm will inhibit oral response)
- n Rhythmic non-nutritive sucking
- n Approximately 32-34 weeks' gestation

### Skin to skin holding

Numerous studies undertaken world-wide demonstrate the importance of skin-to-skin (STS) care and its effectiveness in promoting physiologic stability in the high risk preterm infant<sup>9,10</sup>. During STS the infant is clad only in a nappy and hat and is placed vertically on the skin between the breasts of the mother. The infant is covered with a blanket and kept in this position for an extended period of time usually no less than 30 minutes and sometimes for many hours. Although the relationship between STS and lactation has been examined less rigorously, there is considerable evidence that the duration of breastfeeding appears to be higher in the mothers of infants who practise STS than for the incubator controls<sup>11</sup>.

Whenever possible it is important to

commence STS in the early postpartum period even when an infant requires mechanical ventilation. Many mothers report experiencing milk ejection during STS and the expression of larger volumes of milk in the period immediately following STS. Mothers also state that their infants gradually display positive feeding behaviours, such as rooting and mouthing and moving towards the nipple<sup>11</sup>. Mothers also develop confidence in handling their babies, which helps to make the eventual progression to breastfeeding easier to achieve.

### Suckling at the empty breast

A series of controlled trials have demonstrated the benefit of non-nutritive sucking (NNS) with a dummy (or soother) for preterm infants<sup>12</sup>. Very low birthweight infants (VLBW) made the transition from tube to oral feeding more quickly when they used a dummy, presumably because of the accelerated maturation of the suckling reflex<sup>12</sup>. Theoretically, this same benefit can be achieved by an infant suckling at a mother's recently expressed breast, an experience that will also stimulate maternal milk production.

NNS can begin as soon as an infant is extubated. Continuous Positive Airway Pressure (CPAP) is not a barrier to NNS, but no attempt should be made to forcibly position the infant's mouth and gums on the areola<sup>13</sup>. The infant is provided with the benefits of warmth and comfort and is given an opportunity to lap, lick milk and



**FIGURE 1** Suckling on an emptied breast promotes maturation of the suckling reflex.



**FIGURE 2** The underarm position – recommended for breastfeeding preterm babies.

suckle (**FIGURE 1**). As an infant matures, the mother can combine suckling on an emptied breast with tube feeding so that an infant learns to associate suckling with feeding. When the infant demonstrates the ability to co-ordinate suckling with swallowing and breathing, the progression from NNS to nutritive suckling can begin.

### Attachment and positioning

Achieving correct attachment and positioning while assisting a mother to breastfeed a preterm baby can be a significant challenge, particularly if there is a considerable disparity between the size of an infant's mouth and his mother's breast. In order to achieve effective milk transfer an infant must obtain an adequate seal, sufficient negative pressure and an adequate suckling mechanism<sup>14</sup>. Mothers must be supported and guided by neonatal staff during early breastfeeds. Infants should be coaxed into a position of flexion with pillows or rolled fabric. Flexion is a key factor to promote a co-ordinated oral response. Hyperextension of the neck during feeding should also be corrected since it reduces jaw stability, increases cheek retraction and reduces the seal between baby's lips and the mother's breast.

The underarm position (sometimes called the 'football hold') is a position, which often works very well for premature babies. This position gives a mother more control of an infant's head and a clear view of the infant's face<sup>15</sup> (**FIGURE 2**). A cross-cradle hold is equally helpful if pillows are used to support the infant in a position level to the breast (**FIGURE 3**). Although positioning is part of the story, attachment

is also of critical importance to feeding outcome. It can be helpful to advise mothers to express prior to the breastfeed to soften the breast, to trigger the milk ejection reflex and to elongate the nipple.

Occasionally a preterm nipple shield is a useful tool (**FIGURE 4**). This is especially helpful when an infant has demonstrated suction pressure too weak to retain the nipple in the mouth during feeding. The use of the shield will provide a uniform rigid structure that extends into the oral cavity, thus allowing more tactile stimulation<sup>16</sup>. As a result, breast attachment can be sustained and the infant is able to respond by suckling vigorously, thus compressing breast tissue. This will facilitate the accumulation of milk in the shield during the pauses in suckling, making it available to the infant when suckling resumes<sup>16</sup>. When the baby

becomes larger and stronger, mothers should be encouraged to wean off the device to promote more effective mammary stimulation and efficient milk transfer.

### Progression of feeding

Most early breastfeeding problems are directly related to immaturity and inconsistency<sup>14</sup>. Preterm infants are often incapable of rhythmic suckling, which may inhibit the milk ejection reflex and restrict milk intake. Unless milk ejection is triggered the amount of milk an infant receives may be insufficient to stimulate the swallow reflex. This will make it very difficult for a baby to progress from isolated suckles to nutritive suckling. Therefore, it is important to offer the breast with the best flow first, so that the infant is more able to get into the rhythm of the chained suckle-swallow response.

Some mothers become conditioned to manual expression. Even when a preterm infant's suckling pattern matures, some mother's experience a significant delay in milk ejection when an infant is put to the breast. Sometimes it is necessary to place an infant on one breast and a pump on the other in order to provide more intense stimulation. Often the infant will respond by suckling eagerly and for a sustained period of time. Gradually as the effectiveness of suckling matures, the milk ejection reflex will become conditioned to the infant's response.

A baby who is breastfeeding effectively suckles vigorously and swallows regularly. The mother should be able to see the baby's jaws moving all the way back to the



**FIGURE 3** Cross cradle hold provides good support for breastfeeding.



**FIGURE 4** Preterm nipple shield – useful when infants have problems retaining the nipple in their mouth.

ears. It can be very helpful to use breast compression during a feed to speed milk flow and to ensure the breast is fully drained. As the infant becomes more functionally adept at feeding, the mother should not be encouraged to limit feeds to a prescribed number of minutes or to a strict feeding schedule. However, it is important to remember that a preterm baby's ability to breastfeed is maturationally dependent. Many infants are not capable of self-regulation until they are between 36-38 weeks' gestation.

### Discharge planning

Researchers from the United States<sup>17</sup> suggest that mothers can estimate milk intake in several ways:

- n by observing the infant's suckle and swallow
- n from maternal perceptions of the milk ejection reflex
- n by the degree of breast fullness

They also advise that the following factors should be considered in the development of a discharge breastfeeding plan:

- n minimum number of feeds in the 24-hour period
- n need for supplementary feedings
- n need for post-feed breast pumping
- n the monitoring of the infant's urination and stooling patterns.

In the immediate discharge period, support must be available from healthcare professionals who are skilled in preterm feeding management. Access to 24 hours' hospital-based support can also make an enormous difference to parents who want clear immediate advice about feeding at home in terms of: what, how, how often and how much to offer, if an infant has a poor feed<sup>18</sup>. Members of voluntary breastfeeding support groups do not always have expert knowledge regarding preterm feeding, although it is important to keep them involved regarding local preterm protocols.

The adage that discharge planning should begin early is crucial in the management of preterm feeding issues.

Simply counselling mothers to merely feed on demand in the post-discharge period is extremely unhelpful and may result in significant infant under-consumption. After hospital discharge the mothers of term babies often worry whether or not they are 'producing enough milk'. However, the universal concern of the mother of a preterm baby is whether the infant is 'getting enough milk'<sup>19</sup>.

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