Provision of nipple shields to preterm infants on a neonatal unit: A survey of current practice

In term infants nipple shields are used as a breastfeeding aid for mothers with breastfeeding problems, although their use is controversial. Preterm infants find it particularly difficult to establish breastfeeding due to immaturity and there have been a few reports that nipple shields are beneficial for some of these infants. A small survey was carried out on the feeding outcomes of 12 preterm infants using nipple shields over a 12 month period on a neonatal unit.

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Key points

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1. Nipple shields should be considered in specific circumstances where a preterm baby experiences difficulty in establishing breastfeeding.
2. The key factors indicating shield use are a baby who is accustomed to a firmer teat and a mother with flat or inverted nipples.
3. Shield use does support establishment of breastfeeding for some preterm infants.
4. Nipple shields may be used to successfully wean a preterm infant from bottle feeding back to full breastfeeding.
5. Audit and research would be helpful to compare breastfeeding outcomes in infants with and without shield use.

Nipple shields have been used for term infants as a breastfeeding aid for a number of feeding problems including poor attachment, cracked or sore nipples, and flat or inverted nipples. Their use is considered controversial for a number of reasons. Some lactation professionals report that by using a nipple shield a baby may become accustomed to a firmer teat and have difficulty returning to the maternal nipple (nipple teat confusion or addiction)[1,2]. Lang[3] states that use of a nipple shield may confuse a baby resulting in a refusal to suckle correctly at the breast and an inability to wean from the shield or abandonment of breastfeeding. The WHO/UNICEF Baby Friendly Hospital Initiative states that no artificial teats or dummies should be given to breastfeeding babies and specifically advises against the use of nipple shields except in rare occasions as a short term measure only. However it does not specify what these rare occasions are[4]. There is a paucity of evidence-based research supporting these views, with published papers frequently consisting of single case reports, commentaries or opinion[5].

The issues of support for breastfeeding in the preterm infant are somewhat different than for the term infant. For the mother, lactation is often mechanically rather than hormonally induced by frequent expressing. It may be some time after birth that the infant is medically stable and mature enough to be put to the breast and able to co-ordinate effective sucking.

Several small studies have reported no adverse effects on total breastfeeding time when using a nipple shield in preterm babies. Clum et al[6] described the prescription of nipple shields for babies who had a 'difficult time' breastfeeding. In her study she reported on 15 babies with a gestational age at birth of 25-36 weeks. All the babies were given nipple shields after 32 weeks postmenstrual age (PMA). At the first feed with the shield, 50% of subjects were reported to have taken 50% or more of their prescribed amount compared with 0% prior to shield use. Ninety three percent continued to breastfeed successfully, 79% exclusively, until discharged. Although this report admittedly only involved a small convenience sample with no comparison to average breastfeeding rates for this population, it does suggest that nipple shields may aid breastfeeding efficiency in preterm infants and do not necessarily have a negative effect on establishing breastfeeding pre discharge from a neonatal unit.

Reduced maternal milk transfer has been highlighted as a potential disadvantage of using nipple shields. Indeed Woolridge[7] reported a reduction in milk transfer of 22% when using a thin latex shield compared to no shield use and in a small randomised control trial Amatayakul et al[8] reported an even greater reduction (45%, $p=<0.05$). Consequently there was concern that reduced volume of intake may have a long term effect on a baby's weight gain. These papers evaluated the effect of nipple shields on milk transfer in healthy term babies who were breastfeeding successfully. Shields used in earlier studies were the thin latex 'mexican hat' type as opposed to the

modern ultra thin silicone shields now available that may interfere less with milk transfer.

In the preterm population, Meier et al[9] studied 34 preterm infants, with a mean PMA of 31.9 weeks, by evaluating mean milk transfer via test weighing. In this study, babies experiencing difficulty breastfeeding, defined as poor attachment, falling asleep or maternal discomfort, were test weighed before and after a feed without a shield and before and after the first feed with the shield. Milk transfer was found to be significantly greater when using the shield (mean 18.4mL vs. 3.9mL, p=0.001). Although this is only a small study, Meier hypothesised that nipple shields may be beneficial in this population of preterm babies.

On the author's own unit, there were individual cases where the use of a nipple shield was reported to have aided the transition from nasogastric tube to breast or from bottle to breast when the mother had previously not been available to breastfeed. Maternal attitudes to nipple shields had also been positive, a fact supported in the literature[10]. In order to examine this further, a survey of the feeding outcome of babies using nipple shields was evaluated on discharge from the unit.

Experience at Queen Charlotte's and Chelsea neonatal unit

On this level three neonatal unit all mothers who wish to breastfeed are given breastfeeding support from qualified nurses, including positioning and attachment advice. Current local guidelines allow for the provision of nipple shields as a last resort where poor attachment results from sore, cracked or flat nipples. The shield selected (small Contact™ nipple shields, Medela AG), is a thin silicone shield with a small bulb covering the nipple and a cut out at the top to allow skin-to-skin contact between baby's nose and the mother's breast (**FIGURE 1**).

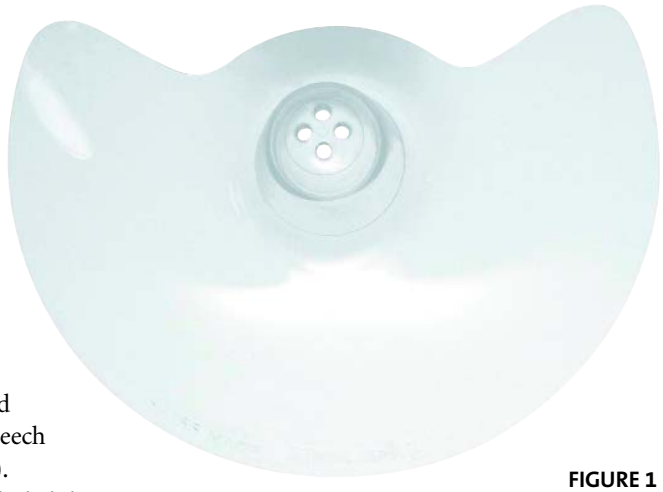

FIGURE 1
A small Contact™ nipple shield. Photo courtesy of Medela AG.

Any baby who in the nurses' opinion would benefit from using a shield was discussed with the Speech Language Therapist (SLT). Information collected included the baby's PMA, medical diagnosis, and indication for nipple shield use. Information on the mother's lactation, and the baby's current feeding regimen (type of milk, method of delivery, volume and frequency) was also collected. Nipple shield use was then agreed between the nurse, SLT and mother. Where not appropriate, this was also recorded.

All mothers given a nipple shield received counselling on the importance of continuing to express after using the shield to empty the breast as much as possible and stimulate lactation. The potential disadvantages of using a shield were discussed. A plan for weaning off the shield was also established between the nurse and mother. Once a nipple shield was provided the baby's feeding continued to be monitored by nursing staff.

At discharge, information regarding the baby's feeding was again recorded including the method and type of milk. If mothers were no longer using the shield or had commenced weaning from the shield, the reasons for this were documented. The data were collected between 01/04/2005 – 31/03/2006. All mothers and babies were followed up at the end of the 12 month study period by telephone by the SLT to ascertain length of shield use and breastfeeding post discharge.

FIGURE 2 A baby breastfeeding using a Contact™ nipple shield. *Photo courtesy of Medela AG.*

Results

There were 562 admissions to the neonatal unit in the year 2005-06. During the 12 month evaluation period 12 requests for nipple shields were received, and none were considered to be inappropriate.

The two most frequent reasons for nipple shield use were flat or inverted nipples (6 infants) or that the baby was accustomed to a firmer teat (5 infants). This was described by nurses as 'an infant whose mouth opens and who searches for the breast but is unable to attach' or as 'the infant who attaches but then does not appear to receive enough sensory stimulation to sustain sucking'. The remaining shield was given to decrease the flow of milk.

Mean PMA when the shield was given was 36 weeks +4 days. The mean length of shield use prior to discharge was 5.5 days, median six days (**TABLE 1**). Data at discharge were collected on 11 of the babies as one baby was transferred to a different hospital immediately after being given the shield.

Ten of the infants were being breastfed partially (6) or exclusively (4) at discharge. The remaining baby was discharged home bottle fed on formula due to the need for maternal medication, which prevented the mother from breastfeeding or providing expressed breast milk. Notably one infant progressed from 100% bottle formula feeds to 90% breastfeeding. The mother of this baby had previously bottle fed two older children due to flat nipples and although

keen to breast feed had been previously unable to. Four infants who were being totally fed by bottle pre shield were discharged breast and bottle feeding, one had established exclusive breastfeeding (**TABLE 2**).

Data was obtained on seven of the eleven babies at 3 and 6 months post discharge (**TABLE 3**). Of the six infants breastfeeding at discharge, one stopped breastfeeding at 1 month, two stopped by 2 months, one by three months and two were still breastfeeding at 6 months, one exclusively. Two mothers gave going back to work as the reason for stopping breastfeeding.

At discharge, eight of the babies were using a shield, two had weaned completely from the shield and continued to breastfeed. Of the mothers followed up, five continued to use the shield post discharge for between 1 to 8 weeks. Four babies continued to breastfeed without the shield. (**TABLE 3**). Comments made by mothers on shield use included that it helped with attachment in three cases particularly with inverted nipples. One mother reported that the shield reduced milk supply therefore stopped using it but continued to breastfeed.

More babies (7) were receiving all their mother's milk as opposed to formula or donor milk at discharge compared to preshield use (5), indicating a sufficiency in the availability of mother's milk (**TABLE 2**).

Discussion

Shield provision during the twelve month study was relatively infrequent averaging one infant a month, reflecting the specific circumstances needed to initiate their use. Although the guidelines in the neonatal unit indicate nipple shield use for cases of sore or cracked nipples, this did not occur in this sample, possibly reflecting the advice given on positioning and attachment resulting in none of the mothers developing sore or cracked nipples.

Nipple shield use for flat or inverted nipples was the most common reason for shield use in this evaluation. Some of the alternative management methods for flat or inverted nipples recommended for term infants may not be possible in preterm infants. For example positioning the baby lying supine and dropping the breast into the baby's mouth[3] may not be appropriate for babies with respiratory difficulties or gastro-oesophageal reflux. Use of a shield therefore may aid the baby to attach to the breast in a more appropriate position. Flat or inverted nipples may present more of a challenge to the preterm infant as they have weaker suction and a relatively smaller mouth which may make it hard to open wide sufficiently and create suction to shape a flatter nipple for good attachment. Nipple stimulation to draw out the nipple would be recommended to encourage attachment before shield use.

The second most frequent reason given – to help babies who were accustomed to a firmer teat – was not included in the neonatal unit's guidelines. One baby was described as slipping off the breast after positioning and attachment advice, but a nipple shield enabled better attachment and this baby subsequently fed 80% from the breast.

Many of the mothers of babies on the unit are unable to spend long periods of time on the unit and therefore when a baby is ready to begin suck feed, bottles are

	Mean (weeks + days)	Range
Gestational age at birth	32 + 3	25 + 5 – 40
Gestational age at shield provision	36 + 4	33 + 6 – 40 + 2
Gestational age at discharge	37 + 3	34 + 4 – 41 + 2
Number of days shield used pre discharge	5.5	1 – 10

TABLE 1 Gestational age at: birth, shield provision and discharge.

Feeding method	Pre nipple shield	Discharge	Using shield at discharge?	
			Yes	No
All Breast	0	4	3	1
All Bottle	2 MEBM 1 formula 1 BEBM	1 formula	n/a	n/a
Bottle and breast	1 MEBM+formula	3 MEBM 3 MEBM+formula	5	1
NGT and bottle	2 MEBM 1 BEBM	0	n/a	n/a
NGT and breast	2 MEBM 1MEBM+formula	0	n/a	n/a

TABLE 2 Feeding method and feed content pre nipple shield provision and at discharge. *B/MEBM = bank/maternal expressed breast milk.*

On discharge	Shield use at home (weeks)	Feeding at 3 months (age breastfeeding stopped)	Feeding at 6 months	Mothers' comments on shield use
Breast + shield	1 wk	breast	breast	Nursing support was vital
Breast + shield	8 wk	bottle EBM/ formula (2 months)	bottle	Helped with inverted nipples
Breast + shield	4 wk	bottle (2 months)	bottle	Helped with attachment
Breast EBM bottle	4 wk	bottle (1 month)	bottle	Easier to attach with shield
Breast EBM/ formula bottle	no	bottle:breast 75:25	75:25 bottle: breast	Slowed milk flow with shield
Breast: bottle 80:20 EBM	3 wk	bottle:breast 40: 60	bottle	
Bottle formula	no	bottle	bottle	Don't remember being given shield as was too ill and worried

TABLE 3 Post discharge feeding outcomes at 3 and 6 months. *EBM = expressed breastmilk*

introduced, particularly at night if a mother is not rooming in. If a mother is ill or lives far away, a bottle may initially be the predominant method of suck feeds. The results from this study indicate that a nipple shield may be helpful if a baby finds the transition from bottle to breastfeeding difficult. This is a scenario specific to preterm infants and is therefore not an indication considered in term literature recommendations.

The baby given the shield to decrease the flow of milk had intra-uterine growth retardation and was keen to breastfeed but struggled to cope with the fast flow of milk from her mother's breast. The nipple shield appeared to help to decrease the flow of milk sufficiently to allow the baby to breastfeed successfully.

There was a wide range of PMA at shield provision. However, the mean of 36 weeks and 4 days suggests that shields were generally being used for babies reaching the equivalent of term gestational age when their sucking co-ordination was mature, but who were struggling to establish breastfeeding.

The data presented refutes the argument that the use of a nipple shield prevents the establishment or maintenance of breastfeeding, since only one subject was not breastfeeding when discharged. The relatively short time period between provision of the shield and discharge (1-10 days), for those subjects who were discharged fully or partially breastfeeding, suggests that nipple shields aid the establishment of breastfeeding and may therefore help to reduce length of hospital stay.

One concern about using nipple shields is the possibility that it will decrease maternal lactation. The number of mothers able to supply all their own milk to meet their baby's requirements increased from preshield to discharge. None of the mothers who were supplying 100% expressed breast milk before shield use experienced a decrease in lactation requiring addition of donor or formula milk, with the exception of the mother prevented from breastfeeding by medication. Whilst these figures are not statistically significant, it does suggest that in this study, use of a nipple shield with the advice to express after use did not have an obvious adverse effect on lactation.

Once a shield has been used for successful breastfeeding it is important that a plan to wean off the shield is made. Use of a nipple shield by the babies in this study did not preclude them from being able to feed directly from the breast and they did not become addicted to the shield. Four babies continued to breastfeed without the nipple shield.

Conclusion

There are limitations to the extent that the data can be generalised as the study was small with subject numbers not being large enough to analyse statistically. Although the population studied was confined to the neonatal unit, the babies within the unit varied considerably in terms of gestational age at birth, and medical status. There were therefore several variables which may have affected the success of breastfeeding which could not be controlled for. However the results do add support to the suggestion that nipple shields may aid establishment of breastfeeding for some preterm infants and in some cases encourage successful transfer from bottle to breastfeeding. Furthermore the study suggests that in addition to sore or cracked nipples, the existence of flat or inverted nipples or a baby that is used to a firmer teat, should be added to the guidelines for nipple shield use.

References

1. **Wilson-Clay B.** Clinical use of silicone nipple shields. *J Hum Lact* 1996; **12**(4): 279-85.
2. **Royal College of Midwives.** Successful Breastfeeding. 2nd ed. Churchill Livingstone. 1991.
3. **Lang S.** Breastfeeding Special Care Babies. 2nd ed. Balliere Tindall. 2002.
4. **Division of Child Health and Development World Health Organisation.** Evidence for the ten steps to successful breastfeeding. Geneva: World Health Organisation. 1998.
5. **Sealy C.N.** Rethinking the use of nipple shields. *J Hum Lact* 1996; **12**(4): 299-300.
6. **Clum D., Primomo J.** Use of a silicone nipple shield with premature infants. *J Hum Lact* 1996; **12**(4): 287-90.
7. **Woolridge M.W., Baum J.D., Drewett R.F.** Effect of a traditional and of a new nipple shield on sucking patterns and milk flow. *Early Hum Dev* 1980; **4**(4): 357-64.
8. **Amatayakul K., Vutyavanich T., Tanthayaphinant O., Tovanabutra S., Yutabootr Y., Drewett R.F.** Serum prolactin and cortisol levels after suckling for varying periods of time and the effect of a nipple shield. *Acta Obstet Gynecol Scand* 1987; **66**(1): 47-51.
9. **Meier P.P., Brown L.P., Hurst N.M. et al.** Nipple shields for preterm infants: Effect on milk transfer and duration of breastfeeding. *J Hum Lact* 2000; **16**(2): 106-14.
10. **Brigham M.** Mothers' reports of the outcome of nipple shield use. *J Hum Lact* 1996; **12**(4): 291-97.