Expressing Breastmilk:

Introduction

Breastmilk provides both long and short-term health benefits for mother and infant including reduced risk of respiratory and gastrointestinal diseases for the child and osteoporosis and some cancers for mother (Renfrew et al 2012). The World Health Organisation (2013) currently recommends exclusive breastfeeding until 6 months and subsequent feeding until 2 years complemented by nutritious foods.

Currently the UK collects data in relation to the proportion of women breastfeeding on discharge from hospital and during infancy however this does not capture the amount of mothers expressing to provide breastmilk (Johns et al 2013). There have been reports of increasing numbers of women expressing yet exact numbers are unknown (Binns et al 2006, Hornbeak 2010).

It is recognised breastfeeding is preferable to encourage the mother-infant bond and enhance the supply of milk tailored to the infant’s needs (Buckley and Charles 2006). However expressing breastmilk is important because it provides an alternative to encouraging continued breastmilk consumption when breastfeeding is either not possible or desired. This is particularly important as the most recent UK infant feeding survey (2012) identified that 73% of women had provided their infant formula milk within the first six weeks of life, yet expressing could be a means of enhancing the length of breastmilk consumption.

In the past, expressed breast milk feeding was chiefly associated with premature or unwell infant, however the domestic personal breast pump has evolved into an efficient and aesthetically pleasing device, meaning it has become increasing common for healthy term infants to be fed via this route (Jiang 2015, Rasmussen and Geraghty 2011).

A systematic review by Johns et al (2013) explored the factors associated with women deciding to express their breastmilk. These include: women who experienced difficulty establishing breastfeeding; those with premature, low birth weight or unwell infants; those with breastfeeding problems such as mastitis, engorgement, nipple pain and milk supply concerns; women who felt uncomfortable feeding in public environments; mothers who were unwell; those with an elevated BMI; women who needed to return to employment or education and those who wanted to allow someone other than themselves to feed their infant. Expressing breast milk could therefore be considered a fundamental part of breastmilk feeding denoting the need for health visitors to be fully aware of this process.

Overview of expressing

There are three modes of expressing breastmilk including hand expression (without using a pump), manually operated pumps and electric pumps. A Cochrane review regarding methods of milk expression for lactating women identified that the most suitable method of expressing milk depended on the time since birth, personal preference and the purpose of expressing (Becker et al 2016).

When an infant feeds at the breast they utilise a rhythm of suction (negative pressure that occurs with the lowering of the lower jaw, causing a vacuum effect whereby the nipple is elongated to assist milk transfer from the breast) and expression (positive pressure which occurs with closure of the lower jaw in which the ducts in the mammary gland are compressed, slowing the transferring of milk, enabling the infant to swallow and open the airway to breath) (Meier et al 2016). Whichever method of expression is employed, this needs to emulate the infant’s ability to stimulate the mammary glands within the breast to enable effective and efficient milk extraction.

Logistics of Expressing

The most commonly identified risk of expressing breast milk include breast damage, infection and milk contamination (Buckley 2009). Therefore, it is important that mothers are provided with accurate information to ensure they undertake this process appropriately.

Prior to commencing expressing, infection control needs to be discussed with the mother to reduce the risk of milk contamination. This includes ensuring hands are thoroughly washed beforehand and all equipment is appropriately cleaned. In 2015 the Joint Working Group of the Healthcare Infection Society and Infection Prevention Society published guidance on the decontamination of breast pump kits. This identified that mothers should never share breast pump milk collection kits and that these should be washed with detergent in warm water, rinsed thoroughly in running water, dried and stored in a dry place (Price et al 2015).

Breastmilk that requires storage, can be kept in a sterile bottle or breast milk bag according to Table 1. Breastmilk may be drunk straight from the fridge or warmed to body temperature utilising a jug of hot water; mothers should be advised never to heat milk via the microwave due to uneven heating that could potentially scald an infant (Sieber et al 1996). If the mother is to feed expressed breastmilk orally to their infant, consideration will be required as to whether they would like to cup or bottle feed.

Table 1: Breastmilk storage

|  |  |
| --- | --- |
| Location | Amount of time milk can be stored |
| Room Temperature | Up to 4 hours |
| Fridge (4oC or lower)  (towards the back) | Up to 5 days |
| Ice compartment of a fridge | Up to 2 weeks |
| Freezer | Up to 6 months  (to defrost place in the fridge and do not re-freeze) |

(Adapted from NHS Choices 2016)

Factors to encourage milk production

There are techniques mothers can utilise to enhance the efficiency and effectiveness of the amount of milk produced via expressing and ensure the breast is fully drained, to promote ongoing milk production (Kent et al 2012). Ordinarily when a baby sucks at the breast this causes the release of oxytocin and encourages the release of milk called the ‘let-down reflex’ or ‘milk ejection reflex’. This reflex can be triggered without feeding the baby but is enhanced by having the infant nearby or kangaroo care via placing the infant on the opposite breast to that being expressed (Moberg and Prime 2013). If the infant cannot be in close proximity, the use of a sensory cue such as the baby’s clothes, a video or photographs can assist in encouraging a mother’s ‘let down reflex’. A systematic review by Becker et al (2011) identified greater milk volume was expressed when mothers warmed or massaged the breast, listened to music or had a relaxation protocol such as a meditation tape. Aspects that can slow the ‘let down reflex’ include stress and pain therefore mothers should be encouraged to adopt these suggested low-cost techniques to make expressing easier.

Mothers who are expressing breast milk to enhance their milk production need to do so frequently and regularly, approximately 8-10 times per day. For those mothers unable to place their infant to the breast post-delivery it is preferable to express milk within the first hour to enhance ongoing milk production (Parker et al 2012).

Hand Expressing

Hand expressing requires no equipment and is therefore a cheaper option in comparison to utilising a breast pump. This acts to removes milk via compressing the milk ducts rather than the use of suction as employed via a pump. Ordinarily this is utilised to assist mothers to recognise the amount of milk they are producing, to relieve engorged breasts and generally for mothers who are predominantly feeding at the breasts but would like to express additional milk. Meier et al (2016) suggest hand expressing should not be utilised routinely for mothers wishing to replace, rather than supplement breastfeeding, particularly as this method has been associated with greater reports of discomfort in comparison to a breast pump. However Ohyama et al (2010) identified hand expressing as the most effective method of expressing colostrum in the first 48 hours post-delivery. This encourages the production of hormones to enhance milk production until milk lactogenesis stage II occurs whereby the breastmilk ‘comes in’ and milk production moves from endocrine to autocrine control. Early hand expressing post-delivery for those unable to breastfeed has been associated with improved breastfeeding rates at two months compared to those mothers utilising a breast pump (Flaherman et al 2012).

In order to hand express the mother needs to cup the breast in a ‘c’ shape around the areola using the forefinger and thumb. This involves trying to build up a rhythm and drops of milk should start to flow, if this does not occur the position may require a slight change

Choosing a Breast Pump

The type of breast pump chosen to express milk depends on the frequency of use and whether this is utilised to replace infant feeding at the breast. Table 2 identifies the variety of breast pumps available and their features.

Table 2: Breast Pump Features

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Manual** | **Personal-use electric** | **Hospital Grade Electric** |
| **Availability** | Purchase | Purchase | Hire |
| **Simultaneous or Sequential Breast Expression** | Single breast collection. One size breast shield. | Single or double breast collection (caution is required as although some pumps appear to express both breasts simultaneously, these could be expressing the milk sequentially). Minimal amount of breast shield sizes. | Double breast collection (both breasts maybe expressed at the same time). Multiple breast shield sizes available. |
| **Breast pump suction patterns (ability to alternate between suction and expression)** | Minimal (this uses compression of the milk ducts) | Some have the ability to mimic breast pump suction patterns with variable rates and vacuum pressures. | These have adjustable rate, rhythm and vacuum pressure. Some have breast pump suction pattern programmes. |
| **Proposed Use** | Brief use for an ongoing breastfed infant. | -Further separation for an ongoing breastfed infant such as employment.  -For times of portability for mothers utilising hospital grade electric pumps. | Long-term Expressing mothers who are partially or fully feeding their infant via expressed breast milk. |

(Adapted from Meier et al 2016)

Manually Operated Pump

Manual pumps can easily be transported but are often slower to express milk in comparison to an electric pump. However Becker et al (2016) established that manually operated pumps are just as effective in the volume of milk produced. These can be either piston or cylinder and are operated by repetitive squeezing of a handle or foot-powered via a pedal, allowing direct control of the pressure and pace of expression. Although significantly quieter than electric pumps these can be strenuous for the user and time consuming as only one breast may be expressed at a time. Therefore these pumps maybe useful for infrequent use and not necessarily long-term expressing.

Electric Pumps

A variety of brands of electric breast pumps are available however these can be categorised into personal use (battery/electric and single/double) and hospital grade pumps. Flaherma and Lee’s (2013) review of milk expression identified several studies that found electric breast pumps to be the most efficient method in terms of obtaining milk volume. It is identified the use of the greatest vacuum acceptable to the mother and pumping both breasts at the same time can enhance milk production due to greater breast stimulation (Burton et al 2013) fast p

Personal use breast pumps can either possess a single or double collection kit, although mothers wanting to simultaneously pump should check the capability of their pump. Some double collection breast pumps have been found to express the breasts sequentially rather than simultaneously. These can be either battery or mains operated and more portable than hospital grade pumps due to their smaller size. These are efficient and effective at expressing milk, particularly useful to supplement mothers who are continuing to breastfeed or for those using hospital grade pumps when out of the household (Meier et al 2016).

Hospital grade pumps are usually faster and more efficient at expressing milk. Ordinarily available within the hospital setting, these can also be rented within the community. These are particularly useful for enabling long-term expressing in which the mother is fully reliant on a pump and the baby is not fed via the breast. The pumps can cycle between a fast pumping rhythm, encouraging milk to start flowing by stimulating the ‘let down reflex’ and a slower expression phase which promotes milk extraction; emulating the manner in which an infant breastfeeds (Mitoulas et al 2002). The difficulty with these expressing pumps is that they are larger in size and therefore less portable. However these are able to accommodate different size breast shields in addition to simultaneous or sequential pumping of the breasts.

Conclusion

An increase in the use of breastfeeding technology such as breast pumps denotes that health professionals need to be fully aware of the variability of methods available to express breastmilk. A thorough knowledge will enable appropriate advice, ensuring mothers employ the best technique according to their requirements. It is hoped that if expressing breastmilk is undertaken properly this will assist to enhance continued breastfeeding and ongoing breastmilk consumption for infants unable to feed at the breast.

References

Becker G, Smith H, Cooney F (2016) Methods of milk expression for lactating women . Cochrane database of systematic reviews. Issue 9.

Binns C, Win N, Zhao Y, Scott J (2006) Trends in the expression of breastmilk 1993-2003. Breastfeeding Review 2006. 14(3): 5-9

Buckley K, Charles G (2006) Benefits and challenges of transitioning preterm infants to at-breast feedings. International Breastfeeding Journal. 1:13

Buckley K (2009) A double-edge sword: lactation consultants’ perception of the impact of breast pumps on the practice of breastfeeding. The Journal of Perinatal Education. 18(2): 13-22

Burton P, Kennedy K, Ahluwalia J, Nicholl R, Lucas A, Fewtrell M (2013) Randomized trial comparing the effectiveness of 2 electric breast pumps in the NICU. Journal of Human Lactation. 29(3): 412-419

Flaherman V, Gay B, Scott C, Avins A, Lee K, Newman T (2012) Randomised trial comparing hand expression with breast pumping for mothers of term newborns feeding poorly. Archives of Disease in Child-Fetal Neonatal Edition. 97 (1): F18-F23

Flaherman V, Lee H (2013) “Breastfeeding” by feeding expressed mother’s milk. Pediatric Clinics of North America. 60 (1): 227-246

Johns H, Forster D, Amir L, McLachlan H (2013) Prevalance and outcomes of breast milk expressing in women and healthy term infants: a systematic review. BMC Pregnancy and Childbirth. 19 (13) 212

Hornbeak D, Dirani M, Sham W, Li J, Young T, Wong T, Chong Y, Saw S (2010) Emerging trends in breastfeeding practice in Singaporean Chinese women: findings from a population-based study. ANNALS Academy of Medicine Singapore. 39: 88-94

Jiang B, Hua J, Wang Y, Fu Y, Zhuang Z, Zhu (2015) Evaluation of the impact of breast milk expression in early postpartum period on breastfeeding duration: a prospective cohort study.BMC Pregnancy Childbirth 15: 268

Kent J, Prime Da, Garbin C (2012) Principles for maintaining or increasing breast milk production. Journal of Obstetric Gynacologic and Neonatal Nursing. 41: 114-121

McAndrew F, Thompson J, Fellow L, Large A, Speed M, Renfrew M (2012) Infant feeding survey 2010. <http://content.digital.nhs.uk/catalogue/PUB08694/Infant-Feeding-Survey-2010-Consolidated-Report.pdf>

# Meier P, Patel A, Hoban R, Engstrom J (2016) Which Breast Pump for Which Mother: An Evidenced-Based Approach to Individualizing Breast Pump Technology. Journal of Perinatology: official journal of the California Perinatal Association. 36(7): 493-499

Mitoulas L, Lai C, Gurrin L, Larsson M, Hartmann P (2002) Effect of vaccum profile on breast milk expression using an electric breast pump. Journal of Human Lactation. 18(4): 353-360

Moberg K, Prime D (2013) Oxytocin effects in mothers and infants during breastfeeding. Infant. 9(6): 201-206

NHS Choices (2016) Expressing and storing breast milk. <http://www.nhs.uk/Conditions/pregnancy-and-baby/pages/expressing-storing-breast-milk.aspx>

Parker L, Sullivan S, Krueger C, Mueller M (2012) Effect of early breast milk expression on milk volume and timing of lactogenesis stage II among mothers of very low-birth-weight infants; A pilot study. Journal of Perinatology. 32(3): 205-209

# Price E, Weaver G, Hoffman P, Jones M, Gilks J, O’Brien V, Ridgway G (2015) Decontamination of breast pump milk collection kits and related items at home and in hospital: guidance from a Joint Working Group of the Healthcare Infection Society and Infection Prevention Society. The Journal of Hospital Infection. 92(3): 213-221

Rasmussen K, Geraghty S (2011) The quiet revolution: Breastfeeding transformed with the use of breast pumps. American Journal of Public Health. 101(8): 1356-1359

Renfrew M, Pokhrel S, Quigley M, McCormick F, Fox-Rushby J, Dodds R, Duffy S, Trueman P, Williams A (2012) Preventing disease and saving resources: the potential contribution of increasing breastfeeding rates in the UK. London: UNICEF United Kingdom

Sieber R, Eberhard P, Gallman P (1996) Heat treatment of milk in domestic microwave ovens. International Dairy Journal. 6(3): 231-246

World Health Organization (2013) Long term effects of breastfeeding: A systematic review. Geneva: WHO Press