Hand expressing in pregnancy and colostrum harvesting—preparation for successful breastfeeding?

Abstract

Colostrum harvesting is a process involving antenatal expressing and storing of colostrum. Its benefits include quicker establishment of 'full lactation' (Singh, 2009), increased confidence in hand expressing (Brisbane and Giglia, 2013), and reduced stress over breast milk supply in the immediate postpartum period (Cox, 2006). Despite its advantages, the use of colostrum harvesting remains limited, with only a small selection of UK Trusts currently utilising this process. In the past, there have been concerns over the safety of antenatal expressing and its potential to initiate premature labour (Soltani and Scott, 2012). A more recent critical review of the literature found that the substantial benefits of early feeding of colostrum outweigh the lack of evidence associated with the risk of preterm labour (Chapman et al, 2013; East et al, 2014). This article discusses the advantages of antenatal hand expressing and colostrum harvesting in view of the best available evidence.

Keywords: Breastfeeding, Antenatal education, Hand expressing, Colostrum harvesting

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Breastfeeding initiation rates in the UK have risen; in 2010, 81% of mothers chose to breastfeed their babies at birth, compared with 76% in 2005. However, breastfeeding is often short-lived as 24% of women breastfeed exclusively at 6 weeks postpartum in England (22% in Scotland; 17% in Wales; and 13% in Northern Ireland), 17% at 3 months and 1% at 6 months in the UK (UNICEF, 2014a).

It is important to find out why many women stop breastfeeding within weeks, despite such high initial breastfeeding rates. This article explores antenatal education and preparation for breastfeeding in the hope of finding solutions to overcome some of the postnatal breastfeeding problems experienced by women. The benefits of colostrum harvesting and extra support for diabetic women are discussed, using the best available evidence, as is the teaching of hand expressing during pregnancy. The inclusion of education in hand-expressing in routine antenatal care could improve women's experiences of breastfeeding and increase rates of breastfeeding continuation.

Colostrum harvesting—what is it and why do it?

Colostrum is a clear or yellow thick fluid, which is rich in proteins, self-digesting fats, hormones, enzymes, vitamins, minerals and immunoglobins, and is excreted by the breasts in pregnancy, during the process of Lactogenesis I. Human milk, unlike infant formula, which is standardised within a very narrow range of composition, is dynamic and uniquely suited to each baby. Its nutritional composition and non-nutritive bioactive factors promote survival and healthy development (Ofteda, 2012; Ballard and Morrow, 2013).

Colostrum is produced in small quantities, but it is rich in immunologic components, such as IgA, lactoferrin, leukocytes, as well as developmental factors such as epidermal growth factor. The primary functions of colostrum are immunologic and trophic, indicated by relatively low concentrations of lactose (Ballard and Morrow, 2013). Colostrum therefore is not only tailored to the nutritional needs of each baby, but also works as a natural and safe vaccine. It protects and lines the baby's digestive system and prevents the baby from developing a range of infections and illnesses. Colostrum is especially important for babies who are premature, small, sick, or at a predisposed risk of developing certain health conditions, such as diabetes.

Colostrum harvesting involves hand expressing and storing colostrum during pregnancy, a practice that was introduced to reduce the number of babies of insulin-dependent diabetic mothers receiving cow's milk formula as a top-up in the event of perinatal hypoglycaemia (Vaarala, 2000). Perinatal hypoglycaemia is associated with transient hyperinsulinaemia and is often seen in babies of mothers with diabetes (Williams, 1997); the condition can affect babies' ability to suckle and therefore increase the need for cup feeding and supplementing with artificial formula (Clay, 2005). Furthermore, women with diabetes in pregnancy may experience breastfeeding issues in the immediate postpartum period owing to delayed lactogenesis caused by the condition

(Neubauer et al, 1993). Studies have shown that receiving oral fluids other than colostrum at birth carries potential life-long risks (Borch-Johnsen et al, 1984; Mayer et al, 1988; Glatthaar et al, 1988; Cavallo et al, 1996). There is also evidence that early exposure to cow's milk protein can trigger a later development of beta-cell autoimmunity, which can lead to cellular damage in the pancreas and type 1 diabetes (Cavallo et al, 1996). In view of these studies, colostrum harvesting offers not only the benefits of reduced reliance on formula, thus reducing the health risks associated with early exposure to cow's milk proteins, but also the health benefits associated with colostrum itself (Morales et al, 2012; Guxens et al, 2014).

The importance of hand expressing

The first 2 hours post-birth are the sensitive period (Bornstein, 1989), and it is the best time for a mother to initiate breastfeeding. Skin-to-skin contact with the baby is crucial in stimulating the baby's natural reflexes to root and suckle (Feber and Makhoul, 2004; Anderson et al, 2003), and separating the baby from the mother at this crucial time can result in decreasing the neonate's ability to initiate breastfeeding, leading to reduction in maternal confidence and self-efficacy (Genna, 2013; Moore et al, 2012; Aghdas et al, 2014). It is important that all women are taught how to hand express effectively (*Table 1*), as knowing how to hand express can overcome many of the early challenges to breastfeeding (UNICEF, 2014b). It is especially useful if mothers (UNICEF, 2014b):

- Need to tempt a reluctant baby to breastfeed
- Have a sleepy baby who is unable to stimulate the milk supply in the first hours
- Have a baby in the neonatal unit
- Need to be reassured about their milk supply
- Have full breasts that make it difficult for baby to latch on effectively
- Have a blocked duct
- Or have difficulty using a breast pump.

The immediate postpartum period is the time when women are often tired, emotional and sleep-deprived following exhausting and sometimes long labour and birth. Breastfeeding difficulties can seem a lot worse at this time when combined with other factors, and unfortunately this is when hand expressing is often introduced to women. Hand expressing is a skill that takes practice and the first attempt will often produce little colostrum, which can add to frustrations and worries, and further affect women's confidence in their bodies' ability to produce adequate supply for the baby.

Difficulties with breastfeeding, whether because of a sleepy baby, a reluctant feeder or other factors,

Table 1. Teaching women to hand express during pregnancy

Prepare	Always wash your hands before handling your breasts
	Prepare a container for collection, such as a small syringe (1 ml or 2 ml syringe to begin will be sufficient) or a pot
	It might be helpful to have a warm bath or a shower before expressing or to apply a warm flannel to stimulate the milk let-down
	Spend a few minutes gently massaging your breasts towards the nipple
How to express	Walk your fingers down your breast towards the nipple until you feel the change in the breast tissue (usually 2.5–4 cm behind the nipple). Place your thumb pad above the nipple and the finger pads below the nipple forming the letter 'C' with the hand as shown in Figure 1
	Squeeze gently, using your thumb and the rest of your fingers in a 'C' shape. This should not hurt—do not squeeze the nipple directly as you can make it sore
	Release the pressure, then repeat building up a rhythm. Try not to slide your fingers over the skin
	At first, only drops will appear. Collect them with a syringe—you may want to ask someone to help you while you are learning. With practice and time you will find it easier and quicker to hand express, and you will notice an increase in the amount of expressed breast milk
	When no more drops come out, move your fingers around and try a different section of the breast and repeat, then swap breasts

Mater Misericordiae Health Services Brisbane (2011); NHS (2014)

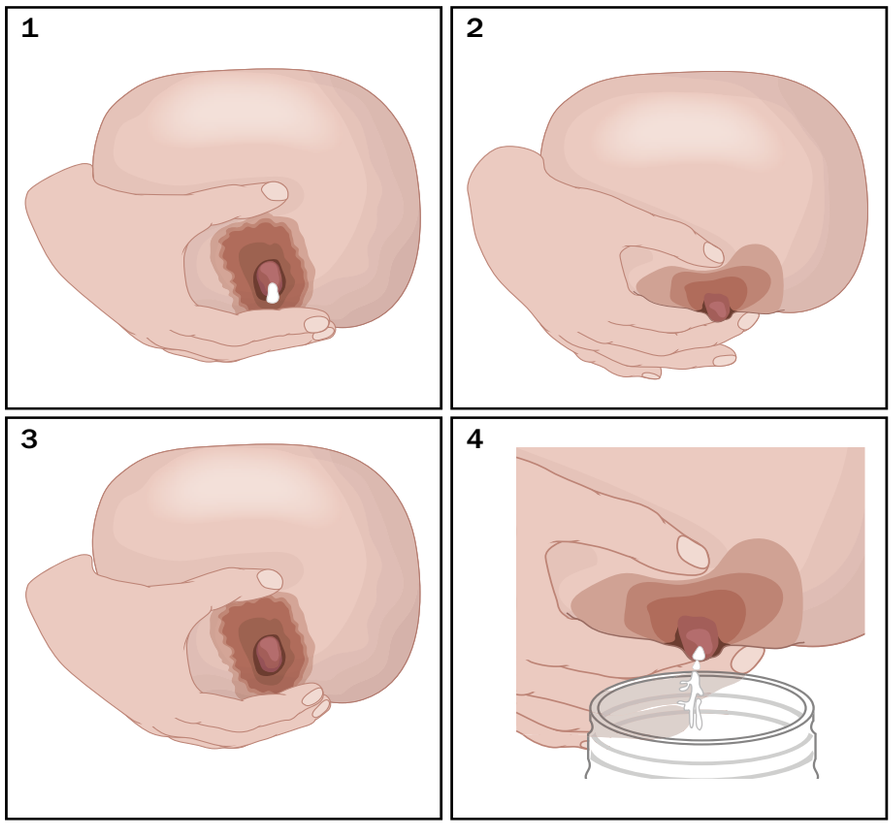

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Figure 1. How to hand express

Table 2. Collecting and storing expressed breast milk

Collecting	
It is best to collect colostrum in either small sterile syringes or pots with lids. Once the syringe is filled with colostrum, insert it back into its original package and label it with the date and time	
Storing	
Room	Can be kept in a sealed container at room temperature for up to 6 hours
Fridge	Can be kept at the back of a fridge (4°C or lower) for up to 5 days
Ice compartment	Can be stored in an ice compartment of a fridge for 2 weeks
Deep freezer	Can be stored in a deep freezer (18°C or lower) for 6 months
Defrosting	
Defrost frozen milk in the fridge overnight (over approximately 12 hours)	
Use as soon as possible after thawing	
Milk may be warmed to body temperature by standing the container in warm water for a few minutes. Do NOT use a microwave as this can cause 'hot spots'	
NEVER refreeze previously frozen milk	

The Breastfeeding Network (2009)

combined with a small amount of colostrum being expressed, can dissuade mothers from breastfeeding and encourage them to supplement with formula. Teaching women to hand express during pregnancy offers many advantages, such as (Singh, 2009; Brisbane and Giglia, 2013):

- Quicker establishment of 'full lactation' among women who have expressed colostrum antenatally
- Increased confidence in the body's ability to produce adequate amounts of breast milk
- Gaining familiarity with the breasts and their functionality
- Increased confidence in hand expressing prior to arrival of the baby.

During pregnancy, women can spend time learning to hand express without the added stress and pressure of a hungry baby. Practising hand expressing over time enables women to gain confidence and notice an increase in the amount of colostrum they have expressed. Women who hand express colostrum during pregnancy often express their satisfaction with the process; they feel more confident and better prepared for breastfeeding (Forster et al, 2011). Furthermore, storing the expressed colostrum provides 'back-up stores', which can be given to the baby in cases of breastfeeding difficulties; this reduces reliance on formula and alleviates some stress over breast milk supply in the immediate postpartum period (Cox, 2006; Brisbane and Giglia, 2013).

Teaching hand expressing during pregnancy could prevent some concerns and problems experienced by women during the immediate postpartum period. However, teaching women to hand express in itself is not an answer to all the breastfeeding issues a woman may experience, but incorporating it into antenatal care could help to improve antenatal education and preparation for breastfeeding and lead to better outcomes.

Antenatal preparation for breastfeeding

There is a range of factors that influence whether or not a mother continues breastfeeding, such as:

- Antenatal intention and attitudes to breastfeeding (Forster et al, 2006; Donath et al, 2003; Henderson and Redshaw, 2011)
- Sociodemographic factors including ethnicity (Henderson and Redshaw, 2011; Agboado et al, 2010)
- Age (Forster et al, 2006; Henderson and Redshaw, 2011; Baxter et al, 2009)
- Maternal education (Henderson and Redshaw, 2011; Baxter et al, 2009; Tarrant et al, 2011)
- Socioeconomic status (Kelly et al, 2006; Amir and Donath, 2008; Brown et al, 2010).

While some factors are difficult to change, others that are associated with breastfeeding continuation, such as maternity care and support, and hospital feeding practices (Forster et al, 2006; Henderson and Redshaw, 2011; Oakley et al, 2014) can be challenged to help women breastfeed successfully for longer.

Breastfeeding support is a central component in addressing low breastfeeding rates, in which the focus should be on creating the most appropriate type of support in terms of timing, intensity and delivery (Oakley et al, 2014). Despite midwives advocating the benefits of breastfeeding (Condon et al, 2013), in order to support successful breastfeeding, there needs to be an improvement in antenatal preparation for breastfeeding (Mattar et al, 2007). While cost can challenge the provision of some quality services in midwifery and other disciplines, the solution could be breastfeeding support delivered by non-health professionals. For example, women may be supported by their peers by voluntary organisations, or they may benefit from specialist support from breastfeeding clinics. These sources of support for women may prevent breastfeeding cessation in the first few weeks (Oakley et al, 2014).

Antenatal preparation for breastfeeding varies around the country; however, several studies have found that a majority of women are unsatisfied

with the delivery or content of breastfeeding education (Henderson and Redshaw, 2011). In order for women to be successful at breastfeeding, it is important for midwives and other health professionals to offer honest, reliable, up-to-date and realistic information (Redshaw and Henderson, 2012). Women need to understand the physiology of their breasts and build trust in their bodies' ability to provide the nutrition required by their baby. In order to effectively prepare women for breastfeeding, antenatal education should be developed from just advertising the benefits of breastfeeding to teaching women important skills and information, such as:

- Colostrum vs. mature milk
- Supply and demand
- That there are higher levels of prolactin at night
- The importance of regular feedings
- Cues and clues of a hungry baby
- Hand expressing.

It is important to explain to women that breastfeeding, like any skill, needs to be learned over time, and that it not uncommon for mastering the skill and gaining confidence to take time (Redshaw and Henderson, 2012). It is important for breastfeeding education to be offered in stages, allowing women to absorb the information and ask questions. Women could become confused or struggle to remember all they have been told if all the information and advice is delivered in one session. Incorporating aids, such as pictures, videos, dolls, knitted breasts and newborn baby's stomach charts (*Figure 2*) can help women and their partners to visualise and understand breastfeeding.

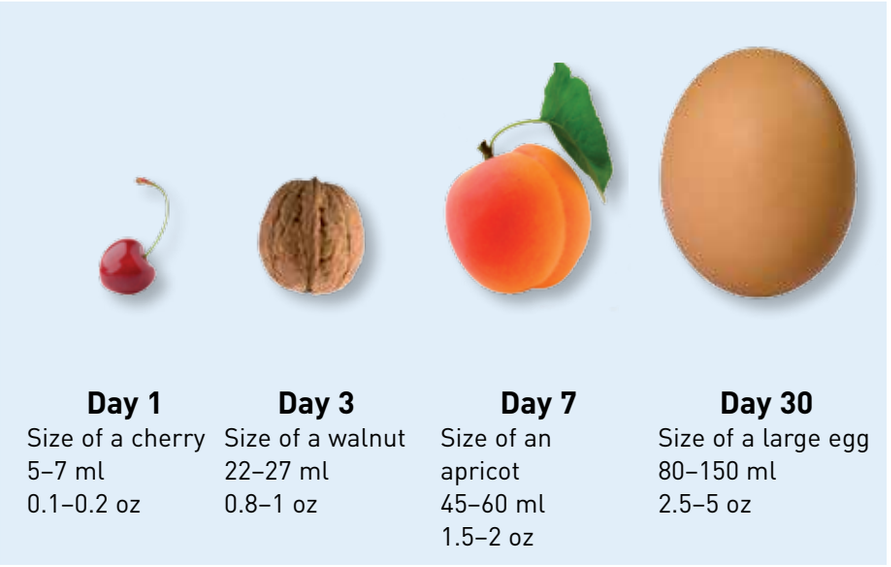

Figure 2. The relative size of a newborn baby's stomach

Challenges

The issue with challenging practices and suggesting change is that there will be opposition. Change is a complex process in midwifery practice and can often be met by resistance from midwives who develop their own styles of practice based on evidence-base, personal values, experiences, training and routines. Furthermore, organisational culture and time constraints in the stretched maternity service may make it difficult for midwives to practise autonomously, and lead to suboptimal care (Nursing and Midwifery Council, 2012). Workload pressures and staff shortages are two major barriers to change and the provision of suboptimal care to women (Gopee and Galloway, 2014). Working in a multidisciplinary service within different settings, such as community and birth centres or hospitals, can make midwives question their authority to implement changes (Kotter, 1995). Support from senior members of the team and management is therefore an important part of facilitating change; without this support, the confidence in implementing change and maintaining the process could be limited.

The challenges to change implementation in relation to provision of informed-choice and thorough antenatal education relating to breastfeeding need to be examined separately, and this could be done through one to one interviews with the midwives. The main challenges found by the author, having worked within this area of midwifery, are time constraints and short appointment times for women's antenatal care and limited postnatal care; as well as deep routed routine practices. The midwives may see the implementation of change in this area of practice as an 'extra' part to their already stretched schedule and therefore may be reluctant to change.

Benefits and concerns related to colostrum harvesting

The rate of induction of labour is rising steadily each year in the UK (Health and Social Care Information Centre, 2013), and antenatal hand expressing can help to tackle this obstetric intervention by helping more women labour spontaneously. Breast or nipple stimulation (through suckling, in women who continue to breastfeed in pregnancy; sexual activity; or preparation for breastfeeding) results in the release of the hormone oxytocin, which may lead to uterine contractions (Amico and Finley, 1986; Soltani and Scott, 2012). A systematic review of six trials comparing stimulation with no intervention in women from 37 weeks' gestation reported that significantly fewer women in the stimulation group

Table 3. The author's proposed delivery of antenatal education and preparation for breastfeeding
28–34 weeks of gestation
Benefits of breastfeeding
Basic physiology of breasts and lactation
Importance of skin-to-skin contact
Bonding
Responsive feeding
Planned co-sleeping
Healthy diet
Feeding positions, including comfort, latch and support
Bra—maternity bra, correct fitting, comfort and support
36 weeks of gestation
Benefits of colostrum
Lactogenesis I and explanation of small quantities of colostrum. Discussion of the newborn baby's stomach size (using aids, such as pictures or BellyBalls)
Importance of hand expressing
Colostrum harvesting, including collecting, storing, freezing and defrosting
Demonstration of hand expressing using knitted breasts, pictures and videos
Opportunity to practise hand expressing
38 weeks of gestation
Signs of a healthy baby
Recognising that baby is getting enough milk, i.e. wet and dirty nappies
Feeding cues
Night feeds—explanation of higher levels of prolactin at night
Cluster feeding
Growth spurts
Fathers—facilitating bonding without the need to feed the baby
Expressing—hand expressing vs. breast pumps
Avoiding teats and dummies
Breastfeeding in public
Breastfeeding support—midwifery care in the hospital and the community, health visitors, local groups and peer support

were not in labour within 72 hours compared with the control groups (Kavanagh et al, 2005). However, these findings were only significant in women who entered the study with a favourable cervix (not in labour). Older trials demonstrated improvements in Bishop score among women who had used breast or nipple stimulation (Salmon et al, 1986; Di Lieto, 1989; Damania et al, 1992). While the potential for antenatal hand expressing of colostrum to induce labour may be advantageous, there are concerns over its safety, owing to its potential to induce labour prematurely (Soltani and Scott, 2012; Forster et al, 2011). These concerns have been raised despite many mothers continuing to breastfeed safely throughout pregnancy (Madarshahian and Hassanabadi, 2012).

Soltani and Scott (2012) reported outcomes from a retrospective cohort study of 94 women with diabetes who expressed or did not express antenatally. They found a trend of earlier birth for mothers who had expressed antenatally compared to mothers who did not. However, all women delivered 'at term'. These concerns are founded from the trend of higher incidence of admissions to neonatal nurseries for babies of mothers who expressed (33% vs. 12%) which correlates with previous studies (Forster et al, 2011). Admission to neonatal nurseries was mainly due to hypoglycaemia; however, it is not known whether mothers who antenatally hand-expressed were able to supplement the baby with the expressed colostrum, nor how much colostrum they had expressed. This significant difference may be due to mothers' reluctance to supplement with formula,

owing to better knowledge of the health risks associated with the introduction of fluids other than breast milk in the early days; and stronger motivation to breastfeed exclusively. Furthermore, the sample size of the study was relatively small and data were collected from only one hospital in the UK. Hospital practices differ throughout the country, and other populations of women may have different attitudes and experiences of antenatal breast milk expression.

There is currently no evidence about the potential benefits and harms of the expression and storage of breast milk during pregnancy (East et al, 2014), and in a recent critical review of the literature (Chapman et al, 2013), the authors concluded that the substantial benefits of early feedings of colostrum outweigh the lack of evidence associated with the risk of preterm labour. However, owing to the lack of strong evidence and to prevent the risk of the onset of premature labour, antenatal expressing should not be introduced until 36–37 weeks' gestation. Research on the safety of colostrum harvesting for women with diabetes is limited, but a randomised controlled trial, the Diabetes and Antenatal Milk Expressing trial (DAME), is underway, which aims to establish whether advising pregnant women with diabetes to express breast milk from 36 weeks' gestation increases the number of infants requiring admission to special or neonatal intensive care units, compared with the infants of women receiving standard care (Forster et al, 2014). The results of this study are expected to be published in 2015 and may inform the introduction of antenatal hand expressing and colostrum harvesting practices in the UK.

Conclusions

Antenatal breastfeeding preparation in the UK should be improved to support women in breastfeeding successfully for longer. While colostrum harvesting and antenatal hand expressing will not solve all breastfeeding problems, they offer a range of benefits, which can help to address the issues faced by women, and prepare them for breastfeeding. This practice is especially important for women who are more likely to experience breastfeeding difficulties in the immediate postpartum period. The medicalised nature of the world may convince mothers that their bodies are unable to cope with pregnancy, birth and breastfeeding without the help of interventional procedures; that birth is unsafe and should be managed in hospitals; and that mothers should supplement their babies with formula because their breast milk supply is not good enough.

Key points

- Skin-to-skin contact is a crucial part of initiating breastfeeding and women should not be separated from their babies after birth unless medically indicated
- Education is key to facilitate successful breastfeeding and improving continuation rates
- Hand expressing is an essential skill that should be taught to all women. Teaching hand expressing during pregnancy offers a range of benefits to women and gives them time to practice the skill overtime prior to the baby's arrival
- Colostrum harvesting offers solutions to overcoming some of the breastfeeding problems experienced by women with pre-existing diabetes and should be offered to them during pregnancy with the appropriate advice and support

Yet these simple practices build trust in mothers' bodies' ability to function and provide the nutrition a baby requires. They promote education and the exploration of the body's function, and allow women to gain confidence and self-efficacy.

Evidence shows colostrum harvesting and antenatal hand expressing are beneficial to diabetic women; however, the safety of these practices needs to be explored further. At presence, the evidence-base does not recommend the introduction of colostrum harvesting for all women; however, this evidence-base is lacking. Further research into antenatal education, preparation for breastfeeding and colostrum harvesting for all women is required. BJM

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