Under the spotlight: the Queen Charlotte's Hospital Milk Bank at 75

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Big birthdays are a good time for reflection. In the case of the milk bank at Queen Charlotte's and Chelsea Hospital, which celebrated its 75th birthday in 2014, it is a fitting time to look at the contribution it makes to the care and nutrition of sick and premature infants.

Queen Charlotte's and Chelsea Hospital (QCCH) provides women's and children's services in west London. It has a tertiary referral maternity unit, a nationally renowned centre for fetal care and a large, level 3 neonatal unit. Imperial College Healthcare NHS Trust (ICHNT) also provides neonatal care at its level 2 neonatal unit (NNU) – the Winnicott Baby Unit – at St Mary's Hospital (SMH), Paddington. Together, the maternity services at QCCH and SMH support a total of around 10,000 births per year over two sites.

The QCCH milk bank (MB) has not closed or stopped operating since being officially established in 1939, making it the longest continually operating MB in the world. Since the hospital moved to its current site in November 2000, the MB has been located on the same floor as the NNU and is an established part of the services provided to infants and mothers. It also supplies donor breast milk (DBM) to the NNU at SMH and, on request, to NNUs throughout north London and the south east of England. A total of 11 other hospital NNUs regularly obtain DBM from QCCH MB and many more occasionally request it. A full time manager, a part time administrator and a part time technical assistant staff the MB; it also benefits from the contributions of



Pasteurised donor breast milk at Queen Charlotte's and Chelsea Hospital milk bank.



FIGURE 1 Analysis of range and diversity of mothers who donated their breast milk.

several volunteers who are essential for maintaining the current levels of activity.

Routine audit and extensive records kept by both the MB and the Trust NNUs make it possible to provide detailed information about the bank's activity and about the local use of donor milk (**FIGURE 1**).

Who are the donors?

Each year the MB recruits about 150 mothers who donate their surplus breast milk. Each mother is fully screened in accordance with NICE clinical guidelines.¹ The majority of donors are mothers who are exclusively breastfeeding a healthy, thriving infant, usually born at term. They choose to express milk once a day for donation to the bank, the volume donated generally varies between 30-250mL per day, although occasionally this is exceeded by mothers who temporarily have an over supply. Mothers are not encouraged to up-regulate their supply other than to accommodate a once-a-day expression for the bank; the needs of the mother's own infant are paramount in all discussions about how much milk, or indeed if, the mother will donate. Prospective donors receive detailed written and verbal instructions on how to express and store their breast milk. They collect their milk in prelabelled, sterile containers supplied by the bank and are asked to store it in a new heavy duty clear polythene bag (also supplied by the bank) in their own home freezer in a drawer, shelf or basket separated from other food. A freezer thermometer is supplied by the bank and, in accordance with NICE guidelines,¹ the donors keep a daily written temperature record that then accompanies each donation sent to the bank (**FIGURE 2**).

The NICE guideline does not specify the maximum age of the donor's infant, in terms of age at recruitment or when ceasing to donate. In common with most UK MBs, the QCCH MB uses six months as the maximum age for initial recruitment followed by 12 months of age as the date of final donation.

The MB also recruits mothers who donate frozen breast milk that was expressed and stored while their baby was being cared for in one of the Trust NNUs or, increasingly, in other NNUs throughout England. Mothers of preterm and sick infants, especially those on Level 3 NNUs, often express for 1-3 months before their baby is able to actively start feeding directly from the breast. During this time, they may be expressing more than their infant needs. The surplus is frozen and when the infant later goes home fully breastfeeding, there is often far more milk stored than may be needed. Much of this milk will be close to the expiry date for donation (within 12 weeks of being expressed, although once pasteurised the milk can be stored until it is six months old) and so the MB continually faces logistical challenges to recruit these mothers and to collect and treat their milk before it passes its expiry date.

A third group of donors are those mothers whose infants have died and who choose to donate their previously expressed milk or, in some instances, the milk they will continue to express specifically for the MB. This 'gift of human sadness' is a means by which bereaved mothers can help and support the optimal care of other babies and their families. It has been suggested that, for some bereaved mothers, expressing and donating milk enables them to fulfil some of their instincts as mothers, thus helping to heal their loss.²

Not all mothers who contact the MB go on to donate their milk. In 2012 and 2013, 6% of mothers who were fully recruited by the bank did not go on to donate any milk. However of all the mothers who contacted the bank interested in becoming a donor, 33% did not return their questionnaire or continue with the donation process. The opportunity for mothers to easily selfexclude themselves prior to the serology tests, contributes to the safety of the milk. This may well be a factor in there having been only one positive serology test result (hepatitis C) in over 20 years of screening donors via blood tests at the QCCH MB. In addition to hepatitis C, donors are screened at the time of recruitment for hepatitis B, human immunodeficiency virus (HIV), human T-lymphotropic virus (HTLV) and syphilis.

The QCCH MB has not experienced a shortage of donors in over ten years and the readily available supply of willing prospective donors who contact the bank on a daily basis belies the myth that MBs have a shortage of donors. However, it is important to recognise that this is not the case for all MBs and that nationally there are fewer donors than would be needed to provide an equitable supply of milk to all preterm infants who may benefit from it. Some mothers who could donate do not,

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FIGURE 2 Donors Do It Safely: one of the documents given to breast milk donors.

simply because they are unaware of the services available. 'Milk banks are the nation's best kept secret' was one of the comments captured on the recent online survey of donating and nondonating breastfeeding mothers and their partners. The survey, *Experiences and Perceptions of UK Milk Banking*, was conducted by a team from Brunel University London, led by Dr Stephanie Tempest, in collaboration with the QCCH MB and the UK Association for Milk Banking (UKAMB) (Tempest et al, in press). In addition, many breastfeeding mothers are very keen to donate but are not able to access a local MB, as detailed by many of the 942 respondents to the online survey and epitomised in the comment 'we would if we could'.

Replacement of retiring donors with new ones carries on throughout the year and the recruitment process is two-fold:

- 1. From advice and encouragement by healthcare professionals
- 2. By the many enthusiastic ex-donors who actively encourage their pregnant friends and family to support the MB.

Activities organised by MB staff are also helpful. These include the annual summer picnics held for donors, ex-donors and MB supporters, events celebrating anniversaries and the World Breast Milk Donor Day that takes place annually on 19 May.

Who are the recipients?

A clinical audit performed during 2013 showed that the MB could

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support the wider use of DBM in both of the Trust NNUs and a revised protocol for the use of DBM was introduced on 1 January 2014. The provision of DBM for preterm infants without access to any, or enough, of their own mother's milk, reflects the recommendations of the ESPGHAN (The European Society for Paediatric Gastroenterology, Hepatology and Nutrition) Committee,³ as a risk reduction strategy for necrotising enterocolitis⁴ and to help facilitate the achievement of full enteral feeds within the optimal time frame.³ The use of DBM is also embedded in Trust-wide NNU enteral feeding protocols to support breastfeeding, while avoiding the use of formula milk, for infants born at less than 34 weeks' gestation together with some groups of older infants being cared for in the NNU (eg growth restricted infants, all infants receiving parenteral nutrition and those having suffered birth asphyxia/receiving cooling treatment).

Use of DBM

During 2013, 332 infants received DBM for between one and 53 days while being cared for in the NNUs (QCCH=218, SMH=114). The majority, 56% (QCCH=58%, SMH=54%), had donor milk feeds for five days or less with 71% (QCCH=72%, SMH=69%) receiving it for seven days or less and 87% (QCCH=88%, SMH=85%) for 14 days or less.

DBM is mainly used to supplement the mother's milk. The total number of feeding days for the infants who received breast milk (donor and/or maternal) in 2013 was 10,038 (QCCH=6035, SMH=4003) and of these:

- 75% were maternal breast milk (MBM) only days (QCCH=74%, SMH=77%)
- 8% were DBM only days (QCCH=8%, SMH=8%)
- 17% were a mixture of DBM and MBM days (QCCH=18%, SMH=16%).

Consistency across the units highlights the equitable support available to mothers to establish lactation despite the different populations on each unit (QCCH babies >23 weeks' gestational age, SMH babies >27 weeks' gestational age).

The volume of pasteurised DBM issued from the MB for the year 2014 was 734 litres, 65% of which was for the ICHNT NNUs. The total volume issued increased from 509 litres in 2013 and 414 litres in 2012. **FIGURE 3** shows the number of days infants received DBM at both units, analysed according to gestational age. The median, maximum and minimum number of days reveal the widely varying range of time over which infants may require DBM, irrespective of good support for mothers to provide their own milk, and serve to illustrate the importance of having ready and easy access to DBM.

The importance of supporting the infant's mother to provide her colostrum and later her mature breast milk is emphasised in the enteral feeding and DBM protocols and a feeding checklist in the nursing notes enables all of the multidisciplinary team, to ensure that appropriate and timely support is provided to the mother.

The availability of DBM enables enteral feeds to commence within the first few hours or days following birth, according to clinical judgement and a feeding protocol that is designed to provide optimal nutritional and immunological support for an infant. The first feeds should, wherever possible, be with the mother's colostrum and with effective and timely lactation support, there is no reason why most mothers cannot provide this. However the establishment of lactation, even with optimal







support for expressing, is often delayed in mothers whose infants are born prematurely, especially if maternal illness is a factor in the early delivery or the birth of a sick infant. Where insufficient or no colostrum is available, the choice to use donor milk (having first obtained maternal consent) helps to reduce the overall time the infant will require parenteral nutrition, with its known increased risks of infection and other disadvantages. There are published studies showing that the availability of DBM reduces the amount of infant formula milk use in infants, while not reducing the amount of maternal milk fed⁵ and also leads to higher rates of exclusive breastfeeding on discharge.6 Unpublished data from Poland and the UK supports this. At QCCH NNU the exclusive rate of breastfeeding/breast milk feeding on discharge has consistently been in excess of 60% in recent years, with more than 90% of infants discharged fully or partially breastfeeding/breast milk feeding. According to National Neonatal Audit Programme data, the rates of exclusive breastfeeding/breast milk feeding on discharge from level 3 NNUs appears to be highest in those units with a MB or those which routinely use DBM in the absence of maternal milk.7

Transporting DBM

The MB benefits from the services of volunteer motorcyclists who collect donor milk from mothers' homes and deliver it to the MB, as well as delivering milk from the MB to other hospital NNUs. The volunteer motorcyclists are provided by SERV (Service by Emergency Rider Volunteers) and have revolutionised the transportation of DBM for the QCCH MB, enabling the current expanded service presented by the growing number of mothers wanting to donate their milk and the growing number of hospitals choosing to access DBM.

Research

The QCCH MB has a long history of supporting research – both clinical and non-clinical. In recent years the MB has worked with Imperial College, London Metropolitan University and Brunel University London. Breast milk that does not meet the standards required by NICE guidelines,¹ and which would otherwise be discarded, is made available for research purposes (with donor consent). It is stored in a freezer that is registered with the Imperial College Tissue Bank and all research milk samples are entered onto its database.

In 2013, the MB at QCCH started to collaborate with researchers in the Department of Surgery and Cancer at Imperial College London to provide surplus pre-pasteurisation milk samples for research into epigenetic risk markers of breast cancer. Preliminary work has established the feasibility of extracting a relatively pure population of breast epithelial cells, from which DNA and RNA can be extracted and analysed. The breast cancer research group, led by Dr James Flanagan, has now been funded by Breast Cancer Campaign to expand the study.

In addition, the MB has also supported and facilitated research undertaken within the College of Health and Life Sciences, Brunel University London, including analysing donor profiles and exploring the experiences and perceptions of milk banking from multiple perspectives. This research led to the national survey (Tempest et al, in press) and it is hoped that MBs nationally will enhance this collaboration by identifying future research priorities and contributing data to ongoing and future research.



FIGURE 3 The Queen Charlotte's and Chelsea Hospital's Milk Bank Assistant, Jennifer Sangalang.

UKAMB

UKAMB, founded in 1997, is based at the QCCH MB. The MB benefits from the integral role that its manager (author Gillian Weaver) holds within the national and global milk banking community. As one of the founders of UKAMB, and the current UK Forum Lead and President of the European Milk Banking Association, Gillian is involved in two key ways:

- 1. Organising national training programmes for MB staff as well as for nurses, neonatologists, dietitians and others with an interest in the provision and use of DBM
- 2. Co-organising the two-day international conference at Brunel University London (October 2014), attended by a global audience of key stakeholders from 20 different countries.

What does the future hold?

There is a need for a strategically developed national service based on the equitable provision of DBM throughout the UK. While Scotland and Northern Ireland, with a single national bank each, are well placed to expand to deliver such a service to their respective neonatal populations, in England it is a more complex challenge. This is in part due to the current geographical spread of the active MBs, their very varied activity levels and the locally based model that predominates. It is likely that the recommendations of a BAPM (British Association of Perinatal Medicine) funded working group, which is currently looking at the use of DBM, will influence and inform future developments of the QCCH and other MBs.

It is very clear that in its 75 years of existence, the MB at QCCH has played a leading role in the provision of safe and accountable supplies of DBM to thousands of vulnerable infants as a result of the generosity and altruism of women who have chosen to donate their surplus breast milk; a simple act of kindness that deserves to be celebrated.

Acknowledgement

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