British Association of Perinatal Medicine

Optimising Maternal Breast Milk for Preterm Infants Part 2

To discharge and beyond

A Quality Improvement Toolkit

September 2022

Contents

Dedication
This toolkit is dedicated to the memory of Kate Westwood, Speciality Trainee in Paediatrics, Plymouth University Hospitals. Kate was a dynamic and vital part of this toolkit working group, her input was hugely influential and greatly valued. Kate very sadly died during the development of this toolkit. With the kind permission of Kate's family, we dedicate this toolkit to Kate's memory.

Abbreviations

AHSN	Academic Health Sciences Network
BAPM	British Association of Perinatal Medicine
BFI	Baby Friendly Initiative
BNF	British National Formulary
BPD	Bronchopulmonary dysplasia
FIC	Family Integrated Care
HIV	Human Immunodeficiency Virus
HQIP	Healthcare Quality Improvement Programme
HTLV	Human T-lymphotropic Virus
MatNeoSIP	Maternity and Neonatal Safety Improvement Programme
MBM	Maternal Breast Milk
MCQIC-SPSP	Maternity & Children's QI Collaborative-Scottish Patient Safety Programme
MDT	Multidisciplinary Team
NEC	Necrotising enterocolitis
NICE	National Institute for Health and Care Excellence
NNAP	National Neonatal Audit Programme
NSQI	Neonatal Services Quality Indicators
ODN	Operational Delivery Network
PDSA	Plan Do Study Act
QI	Quality Improvement
RCT	Randomised controlled trial
RCPCH	Royal College of Paediatrics and Child Health
ROP	Retinopathy of prematurity
SPC	Statistical process control
SSC	Skin to Skin care
UNICEF	United Nations Children's Fund
WHO	World Health Organisation

Statement on Inclusive Language and Practice

BAPM is aware that the use of gendered language such as mother and maternal, as well as breast and breast milk feeding, can make some families feel excluded. When we use these words in this document we are referring to all birthing people and people who are lactating, regardless of their gender identity.

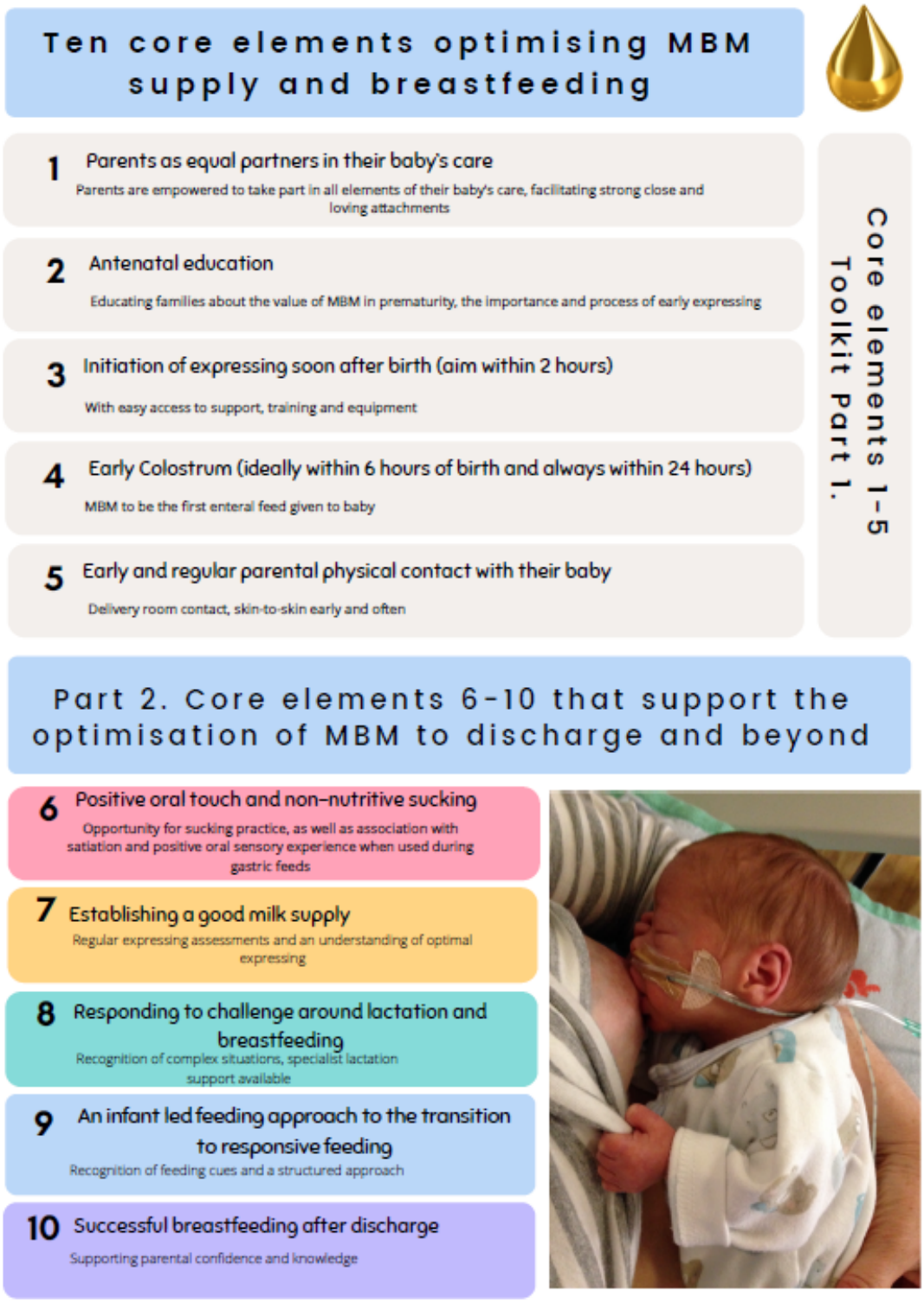
When supporting individual families, professionals should use the terms that the family identifies with, as well as their desired pronouns. Alternative terms may include nursing, lactation, chestfeeding or feeding, instead of breastfeeding. There is NHS information for transgender and non-ninary parents: www.nhs.uk/pregnancy/having-a-baby-if-you-are-lgbt-plus/chestfeeding-if-youre-trans-or-non-binary/

Professionals should be aware of the range of nuances around lactation in the LGBTQ community – for example that a non-birthing parent such as a lesbian partner may want to attempt to induce lactation, or may already be lactating for an older child, in order to provide milk for and/or co-nurse a preterm baby. A transgender man or non-binary person who has given birth may want to express milk and/or feed a preterm baby at the chest. These situations require specialist support to maximise lactation if that is what the family desires, and to provide guidance on specific challenges. Readers should look elsewhere for specialised information in these contexts. A general overview can be found here: www.hifn.org/sex-gender-orientation. The Academy of Breastfeeding Medicine has published a useful clinical protocol[1] on Lactation Care for Lesbian, Gay, Bisexual, Transgender, Queer, Questioning, Plus Patients, which has a section on NICU implications. However, much of the guidance in this toolkit remains highly relevant for all families.

Overview

This toolkit is the second of a two-part series, which together support the implementation of ten core elements to optimise the provision of Maternal Breast Milk (MBM) for preterm babies throughout the neonatal journey, to discharge and beyond. BAPM produced the perinatal Maternal Breast Milk QI toolkit[2] in 2021 covering the foundational first five elements, focussing on the initiation of lactation (Figure 1). The objective of this toolkit is to deliver the subsequent five elements, focusing on sustaining lactation and transitioning to breastfeeding though the neonatal stay, to discharge and beyond. These elements are colour-coded as themes throughout the toolkit.

Figure 1. Ten core elements optimising MBM supply and breastfeeding



This toolkit is aimed at individuals and teams who are involved in quality improvement around MBM:

- If you have the resources to undertake a full change management QI project but have little knowledge or experience you may want to read this toolkit in its entirety.
- If you have some QI experience from other projects but know a limited amount about improving MBM you may wish to focus on the evidence and success stories.
- If you know a lot about MBM and supporting mothers but lack QI knowledge you may choose to focus on understanding the QI journey and resources.
- If you are tasked with collecting or interpreting data, look out for the data tools.
- If your QI project team is a mix of all of the above there should be something in this toolkit for everyone to get your project started.

This toolkit will provide your team with the following resources:

- The rationale for Maternal Breast Milk when you and your team, or those supporting the project at executive level, require to know the evidence for change and organisational drivers.
- Easy to use QI tools to understand where you are and what you need to start your project.
- Guidance about how to build your team and secure commitment for your project.
- Examples of QI that have been shown to be successful in improving MBM for preterm babies.
- Tools to help you measure and understand the impact of your changes.
- Examples of how to embed change and sustain momentum including parent stories.

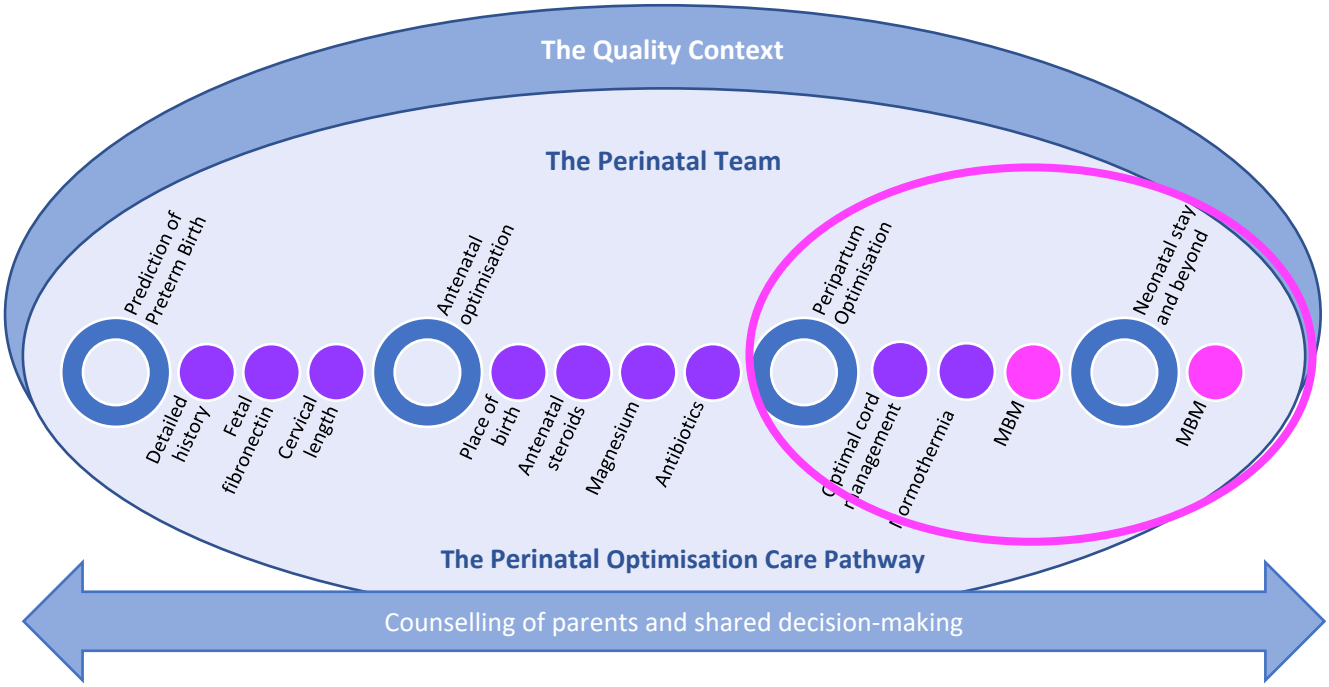
Introduction

The British Association of Perinatal Medicine (BAPM) aims to improve standards of perinatal care by supporting all those involved in providing this care to optimise their knowledge and skills. The National Neonatal Audit Programme (NNAP)[3] sets evidence-based standards on key clinical outcomes and in turn identifies areas for quality improvement (QI) concerning the delivery and outcomes of neonatal care. With these shared goals in mind, the BAPM, the NNAP and other key stakeholder organisations in perinatal care have collaborated in national quality improvement initiatives to target key NNAP measures. The BAPM website offers a range of free QI resources, links to easy to use templates and e-learning, QI tutorials and a forum for shared learning[4]. The toolkit does not intend to replicate any existing local or national QI activity undertaken in the area of focus but to complement these endeavours with a practical step-by-step guide.

The Preterm Optimisation Care Pathway

Preterm optimisation (Figure 2) refers to the process of reliably delivering evidence-based interventions in the antenatal, intrapartum and neonatal period to improve preterm outcomes. Examples of current perinatal optimisation initiatives, which aim to result in consistent application of a bundle of interventions, are those of the West of England AHSN PERIPrem bundle[5] and the SPSP-MCQIC Preterm Wellbeing Package[6].

Figure 2. The Preterm Optimisation Care Pathway



Quality Improvement work for MBM will involve community and primary care teams as well as perinatal teams. Implementation success can only occur within a favourable 'Quality Context' where the structure and processes support an optimal environment for delivering quality improvement. Such key contextual features are described in the BAPM Neonatal Service Quality Indicators[7] (Appendix 2).

Optimising Maternal Breast Milk for Preterm Babies: Context and Objectives

> "Maternal Breast Milk for preterm babies is an exceptional example of both personalised and precision medicine."

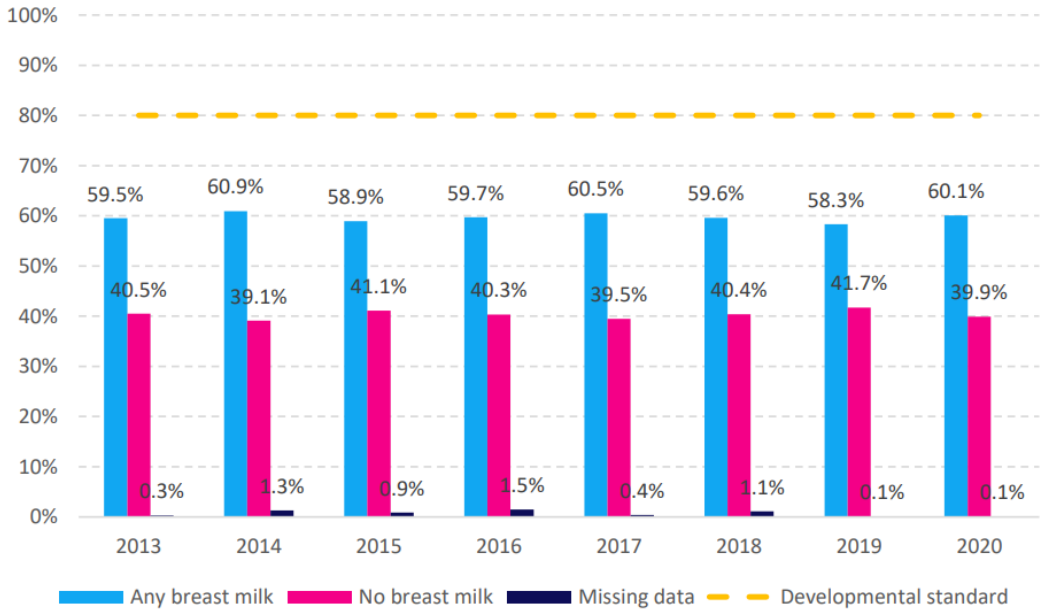
The central focus of this toolkit **is babies born at less than 34 weeks gestation**; however the contents will likely support improved Maternal Breast Milk (MBM) provision for other babies receiving neonatal or postnatal care.

The BAPM perinatal MBM QI toolkit[2] addressed the first five of ten core elements that support the optimisation of MBM supply and transition to breastfeeding for preterm babies. Continuing provision of high quality care beyond the perinatal period is essential to optimise long-term sustainable MBM feeding outcomes. The objective of this toolkit is to deliver the second five elements (Figure 1), which build upon the foundation of the first toolkit.

Organisational Drivers

1. National Neonatal Audit Programme (NNAP)[3]: Since 2013 the NNAP has reported on the proportion of babies with gestation at birth less than 33 weeks who are receiving any MBM at discharge home[3]. In 2020 this was changed to include only infants born at less than 32 weeks (Figure 3).
    a. In 2020, 82% of eligible babies received any MBM on day 14 and 60% received any MBM at the time of discharge from neonatal care
    b. Prevalence of MBM feeding at discharge varied more widely between neonatal networks than prevalence of early MBM feeding. At 14 days of life, the proportion ranges from 75% to 89%. At discharge, the proportion ranges from 48% to 76%
    c. The report concludes *"There has been no significant change in the proportion of babies receiving breast milk, either at 14 days of age or at discharge from neonatal care in recent years. However, nationally, rates of breast milk feeding appear to have been maintained despite the COVID-19 pandemic. Low rates of breast milk feeding, variation by geography in use of breast milk, and variation within unit types has persisted over time"*

Figure 3. Breast milk feeding at discharge home, by NNAP reporting year (2013 to 2020), for very preterm babies[8]



**Note, prior to 2019, the upper gestational age limit was 33 weeks.*

2. Maternity & Neonatal Safety Improvement Programme (MatNeoSIP)[9]: Optimisation and stabilisation of the very preterm infant is one of the three drivers of this national improvement programme. Strategies to optimise MBM are key elements of this work.

3. GIRFT (Getting It Right First Time)
    a. The GIRFT national report for Neonatology[10] has, as one of the key recommendations, to: *"Improve early access to breast milk and sustaining numbers of babies receiving breast milk during their entire stay in the neonatal unit,* with specific reference to use of the BAPM MBM Toolkits to drive this improvement
    b. The GIRFT national report for Paediatric General Surgery and Urology states a key aim to: "*Reduce the mortality rates in premature babies with necrotising enterocolitis by encouraging breast feeding"* and recommends *"Trusts to encourage maternal breast feeding for premature babies, with a view to maximising breast feeding at discharge"*

4. Scottish Patient Safety Programme – Maternity and Children Quality Improvement Collaborative (SPSP MCQIC)[6]: The five-year plan for maternity and neonatal care includes the recommendation that *"Parents should be involved in decision-making throughout and involved in practical aspects of care as much as possible. This includes… support for breastfeeding".*

5. UNICEF Baby Friendly Initiative (BFI)[11]: The Department of Health, England, has asked all maternity units in the country to deliver an accredited, evidence-based infant feeding programme such as the UNICEF BFI[12]. Units across the devolved nations will also be following this initiative to support their infant feeding work. The National Institute of Health and Care Excellence (NICE) has defined UNICEF BFI accreditation as a universal minimum standard[13]. Historically neonatal units gained BFI accreditation through their associated maternity unit but since 2015 it is possible to gain specific neonatal accreditation, which is

being pursued by units of all levels across the country.

6. The Welsh government has committed to ensuring that 'breastfeeding is a core component of training' in the All Wales Breastfeeding Five Year Action Plan[14].

7. The Scottish Government "Becoming Breastfeeding Friendly" report calls for evidence based training to enable families to have equitable access to effective infant feeding support[15].

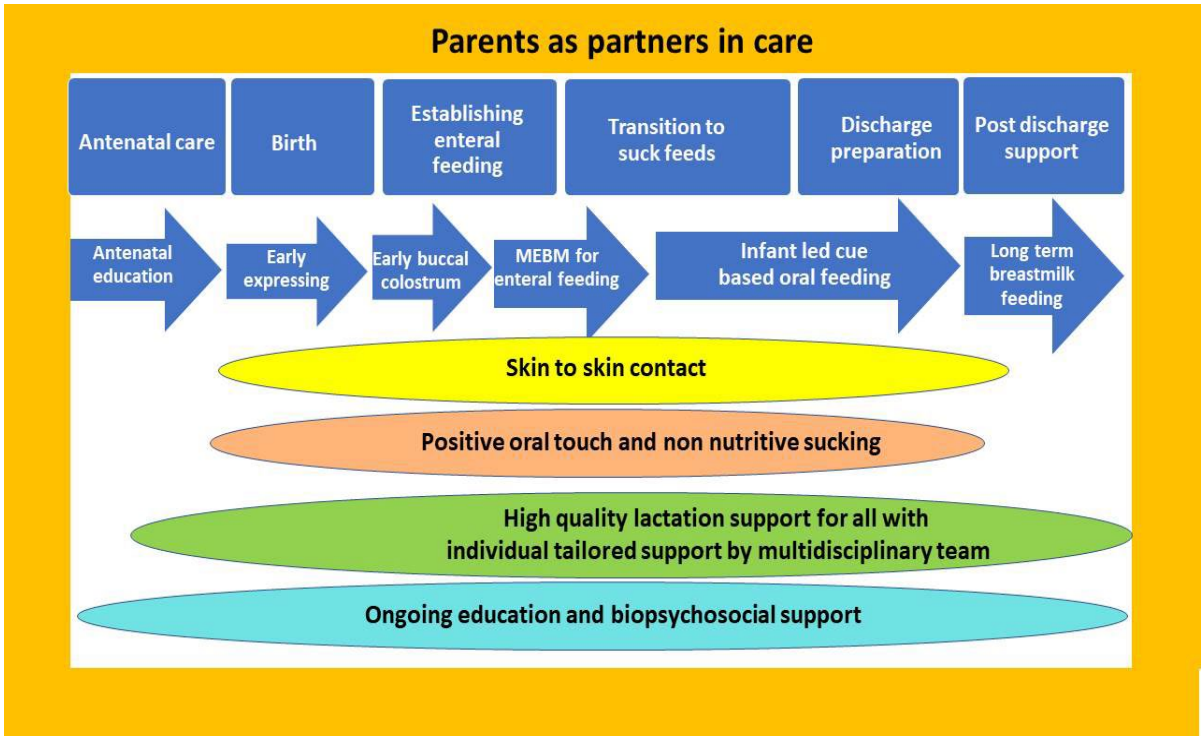
8. Bliss Baby Charter[16] has been recognised by the Scottish Government and in the Neonatal Critical Care Review in England as driving improvements in parental involvement in their baby's care. The Baby Charter has a specific principle relating to MBM feeding support.

Both the Bliss Baby Charter and the BFI have been recommended by the NNAP as important tools to drive improvement in breastfeeding rates and this toolkit should be used as a **complementary resource** to these wider initiatives, supporting units on their improvement journey.

The role of Family Centred & Family Integrated Care

Key components for the transition to direct breastfeeding are a supportive culture that transmits confidence in breastfeeding, expert support and adequate facilities to maximise maternal presence. These are part of the **Family Integrated Care (FICare) model** – more details on implementing FICare are given in the **BAPM Framework for Practice** "Implementing Family Integrated Care"[17]. The holistic, multidisciplinary and family-centred approach to quality improvement in this area cannot be over-emphasised (**Figure 4**).

Figure 4: A holistic model for Quality Improvement in MBM feeding



Rationale: Impact of MBM

MBM is the **optimal form of feeding for preterm infants and is associated with significant short and long-term benefits** (see Figure 5). Babies are less likely to develop necrotising enterocolitis, infection, chronic lung disease and retinopathy of prematurity[18–21]. Intermediate health benefits for preterm babies include improved neurodevelopmental outcomes[22], fewer hospitalizations in the first year after discharge compared to babies who are formula fed[23], increased lean mass[24] and reduction in the rate of Sudden Infant Death Syndrome (SIDS)[25]. Long-term impacts include mitigation of long-term adverse effects of premature birth on cardiovascular health (such as impaired heart function, hypertension and metabolic syndrome[26]). Our understanding of the developmental functions of MBM is limited at present – for example new research shows that pluripotent maternal stem cells ingested in MBM can be incorporated into neonatal brain cells (in rat models[27,28]). There are also significant health impacts for the mother, such as reduced rates of breast and ovarian cancer and improved cardiovascular health[25].

Figure 5. The ongoing impact of MBM on preterm babies:

MBM maternal breast milk; VLBW very low birth weight; ELBW extremely low birth weight; NEC necrotising enterocolitis. References[18–20,22,23,25,26,29–32]

Maternal Mental Health and Wellbeing:

Parents whose babies have been admitted to NICU have high levels of anxiety, depression and post-traumatic stress reactions – higher than the background rate perinatally[33,34]. Feelings include fear, guilt, inadequacy, disconnection from the infant and a loss of the parenting role[35]. Difficulty in establishing lactation and the experience of feeding choices being taken away from the parents (either a choice to formula feed or a choice to breastmilk feed), must be seen within this challenging context[36]. In contrast lactation can be a pathway for reconnection and sense of purpose to counter these emotions[37].

Expressing is a learned skill, which **might feel overwhelming at a time of high anxiety** for their baby's health[38]. Mothers can experience lactation support as imposing pressure to express[39,40] and expressing can compete with other demands including self-care and caring for their baby[36]. Expressing can feel like an alienating experience that emphasises disconnection from the baby[39,41], but can also be seen as a bridge to the baby and "the one gift that no one else can give"[41]. Lactation can lead to feelings of guilt, failure and anxiety:

"[pumping] added to my post-natal trauma & depression. I will never forget how much of a failure… I felt"[38]

"…often a choice between sleeping and expressing which leads to horrendous guilt when choosing the former and risking health to prioritise the latter"[38]

Conversely when managed well, mothers can find successful provision of MBM for their preterm baby a positive experience, supporting **bonding, confidence, connection and meaning**[37,42,43].

"I'm giving him life, medicine, food, and a part of me"[44]

"It [expressing] went right. I was proud of my milk supply. I knew it was important for my baby"[37]

While support and encouragement to establish MBM feeding is important, so is respecting and really hearing what parents are saying if they are distressed and want to discuss other types of feeding.

Health economics

If all premature infants could be fed MBM in the neonatal unit, the total lifetime cost savings to the NHS due to improved health outcomes is estimated to be **£47 million per year, with a total lifetime Quality of Life Years gain of 10,594.** This analysis also estimates 238 fewer deaths due to neonatal infections and SIDS, resulting in a gain of approximately £153 million in lifetime productivity[45]. As is the case with all economic models based on limited data currently available, the results should be interpreted with caution. Further research in this area will be helpful.

Challenges to MBM feeding in prematurity

Mothers of premature infants encounter a variety of feeding barriers and challenges, which mean that despite the known benefits of maximising MBM for preterm babies, a large proportion in the UK are currently not able to be fed an exclusive MBM diet. A higher percentage of preterm babies receive MBM in the first days of life than term or late preterm babies[46], however, by around two months of life rates of any breastfeeding drop below those of term babies[47]**. At six months actual age the rate of any MBM feeding in very preterm babies in the UK is around 25%** - second worst of 11 countries involved in the European EPICE study[47,48].

Established barriers are associated with shorter duration of any/exclusive MBM feeding in very preterm babies – many of these are common to term babies, such as lower maternal age, lower socioeconomic status and education level, maternal smoking and multiple birth[49–55]. Prematurity-specific factors associated with shorter duration of MBM feeding are longer length of stay[52,55,56] and presence of chronic lung disease[49,50]. There are systemic and social barriers to MBM feeding for babies & families within

neonatal care including unsuitable facilities on neonatal units to stay overnight, financial challenges to travelling to the unit and inflexible and unpaid family leave policies.

Contraindications to MBM

There are very few situations in which MBM would be contraindicated for a preterm baby. These include maternal HTLV lymphoma, infant classical galactosaemia, congenital lactase deficiency (rare, not to be confused with "lactose intolerance") and, in certain situations, maternal HIV (see most up to date BHIVA guidance[57]). NICE[13] recommends that maternal medication suitability in lactation should be checked with specialist sources, such as the UK Drugs in Lactation Service UKDILAS[58] (an NHS specialist formulary freely searchable online, as well as available for support via email and phone), rather than the British National Formulary (BNF). Maternal medications can also be checked with UK specialist pharmacists at the Breastfeeding Network's Drugs in Breastmilk service[59] and via national sources from other countries such as LactMed[60] and E-Lactancia[61]. Whilst medication suitability is being checked, mothers should be encouraged to continue to express, labelling their milk appropriately.

Guidance for safe storage and handling of MBM is outside of the scope of this QI toolkit (see British Dietetic Association handling breast milk guideline[62])

Evidence supporting strategies to increase MBM

Maximising the likelihood of long-term breastfeeding in prematurity starts in the perinatal period with core elements 1-5 (MBM Toolkit Part 1) and continues throughout the neonatal care journey, and after discharge. A summary of the most relevant or useful evidence can be found here for each of the Core Elements 6-10.

6. Positive oral touch & non-nutritive sucking

Sucking practice, association with satiation and positive oral sensory experience

Non-nutritive sucking (NNS) provides the opportunity for sucking practice, as well as association with satiation and positive oral sensory experience when used during gastric feeds. NNS on a recently expressed breast is an alternative to pacifier use, which shows promise in early phase research[63]. It would be expected that NNS will decrease once the baby has sufficient maturity to suck nutritively. Expert opinion is that gastric tubes should be placed in the nose when possible to reduce negative oral stimulation, allow free movement of the tongue and enable an effective seal. Skin to skin contact, oral colostrum and mouth care with milk also give babies exposure to beneficial multi-sensory experiences as part of the continuum that aids the transition to direct breastfeeding, as referenced in Part 1 of this toolkit.

Evidence	Evidence sources
A programme of sensory-motor-oral stimulation and NNS increased breastfeeding at discharge, 3 months and 6 months after discharge (from 47% to 77%; from 18% to 47% and from 10% to 27% respectively).	Pimenta 2008[64] (RCT)
Oral stimulation (specific procedure of finger stroking stimulation around the mouth before or during nutritive/non-nutritive sucking) reduced time to transition to oral feeds (MD -4.8 days). Low strength of evidence.	Greene 2016[65] (Cochrane review)
NNS alone reduced time to full oral feeds (mean difference -5.5 days). Low strength of evidence. Two individual studies showed that use of a pacifier during NG feeds reduced time to transition to full breastfeeding from 49 to 38 days in very preterm infants, and from 7 to 5 days in 30-34 week infants.	Foster 2016[66] (Cochrane review) Say 2018[67], Kaya 2017[68]
A national cohort study found that minimising the use of a pacifier was associated with higher exclusive breastfeeding at discharge (OR 0.4).	Maastrup 2014[69] (cohort study)
An RCT showed no difference in breastfeeding outcomes with and without use of a pacifier, although a third of the no pacifier group used a pacifier by parental choice (crossover), meaning that this is weak evidence.	Collins 2004[70] (RCT)

7. Establishing a good milk supply

Regular expressing assessments and an understanding of optimal expressing (also see **appendix 3**)

All mothers of preterm babies should be supported to establish a sufficient and sustainable milk supply, although some may find this impossible despite their best efforts. This not only involves explaining the importance of best practice patterns of expressing to parents (outlined below), but also putting in place supportive policies and facilities to make these regimes as easy as possible to carry out, giving positive, supportive reinforcement to parents and recognising the vital supportive role of partners.

The Unicef Baby Friendly Initiative (BFI) recommends expressing 8-10 times per day and targeting a 24-hour expressed milk yield of 750ml by day 10-14 to mimic the breastfeeding pattern and intake of a term baby[12]. Although milk requirements of preterm babies are lower, it may be more difficult to increase milk yield later if expressed milk volumes are low in this 'critical window'[71–74]. Expressed milk volumes do not always reflect a mother's or baby's breastfeeding ability or success.

There are obvious difficulties to the integration of this expressing pattern and the family's other priorities including caring for their baby and protecting their physical and mental health. Parents value personalised support to balance their needs and priorities. Staff must be careful to encourage and empower parents, while avoiding excessive pressure or an impression of valuing mothers only through the amount of milk they can express[39]. For example, a relational approach can emphasise the connection to the baby that any amount of expressing and MBM brings as well as other aspects of connection that mother and baby can have both in relation to feeding and in their wider care[75].

Regular review of expressing in the first few weeks is important, both in terms of volumes expressed and the mother's understanding, skills, motivation, confidence and impact on mental health – although it is noted that some mothers may find it demoralising to have frequent enquiries made about expressing so sensitivity and coordination is required. Some women will not want to or will not be able to continue with expression. Part of not applying pressure and supporting women is recognising and respecting when a family wants to try a different approach. It is vital that professionals recognise this and are able to adapt the support they give accordingly.

Skin to skin contact improves milk yield from a single expressing session during or after skin to skin contact[76], and also long term milk volumes[77], as outlined in part 1 of this toolkit. Please note, the evidence table cannot comprehensively review the large amount of relevant evidence and has therefore selected studies with the most clinically relevant findings.

Intervention	Evidence	Source
Policies supporting expressing	Associated with increased MBM at discharge for very preterm infants (adjusted OR 2.0).	Mitha 2019a[78] (multicentre cohort study)
Target yield that is higher than the preterm baby's enteral needs in first few weeks of life	*No studies looked at the UK consensus recommendation of aiming for 750ml in 24 hours by day 10-14 after birth - more research is needed to ascertain what volume targets are optimal in prematurity.*	
	Odds ratio of any MBM at discharge was 9.7 for those expressing >500ml/day at day 14. Expressing >500ml/day at day 14 was the strongest predictor for any MBM at discharge of all those studied.	Hoban 2018a[79] (cohort study)
	The optimal yield on day 7 was 407ml & on day 14 was 518ml. Optimal yield defined as maximising sensitivity and specificity to predict a yield of ≥750ml by day 42.	Ru 2020[80] (cohort study)
Electric pumps	Double electric pumping from birth yielded a higher volume of milk up to day 7 of life than hand expressing (mean 17ml/day compared to 3ml/day on day 1).	Lussier 2015[81] (RCT)
	No difference in volumes expressed or long-term breastfeeding outcomes between types/brands of pump. No GRADE assessment was made of strength of evidence.	Becker 2016[82] (Cochrane review)

	Novel electric pump suction pattern (Medela Preemie+) used for first few days of baby's life showed increased volume of milk from day 6 of life onwards, compared to standard suction pattern throughout (200ml/day increase at day 6).	Meier 2012[83] (RCT)
Simultaneous expression (both breasts at the same time)	Simultaneous expression reduces time spent expressing compared to sequential expressing (8 hours/week compared to 11 hours/week).	Groh-Wargo 1995[84] (RCT)
	Simultaneous expression increased milk volume compared to sequential expression (88g/session compared to 51g/session).	Jones 2001[85] (RCT)
Expressing frequency	*Few studies looked at the UK consensus recommendation of 8-10 times per day - more research is needed to ascertain optimal patterns of expressing.*	
	Expressing ≥6 times/day was associated with higher yield at 42 days, from average 558ml to 1179ml, and with higher milk fat, carbohydrate and energy levels on day 7.	Ru 2020[80] (cohort study)
	86% of mothers who expressed ≥5 times/day achieved target yield (defined as 500ml/day by day 14), whereas 22% of mothers who expressed <5 times/day achieved target yield.	Hoban 2018b[86] (cohort study)
Breast massage and warmth	Breast massage increases volume expressed (125g/session compared to 88g/session).	Jones 2001[85] (RCT)
	"Hands on pumping" (breast massage during pumping directed at maximising milk jets) was associated with increased volume (individual before and after comparison; from 583ml/day before instruction at mean 21 days after birth to 863ml/day at week 8)	Morton 2009[87] (uncontrolled observational study)
	Warming the breast with a microwaveable compress for 20 minutes increased volume expressed (45ml/session compared to 32ml/session).	Yigit 2012[88] (RCT)
Maternal relaxation & connection to infant during expressing	Listening to a relaxation-visualisation soundtrack during expressing increased milk yield (on day 14 an increase of 544ml). The addition of watching images of their own baby increased yield further (on day 14 a further increase of 166ml).	Keith 2012[89] (RCT)
	Expressed milk yield did not significantly increase in a NICU based study of mindfulness meditation.	Massa 2022[90] (RCT)

8. Responding to challenges around breastfeeding and lactation

Proactive & timely recognition of complex situations, with appropriate access to specialist lactation support

All perinatal staff should receive appropriate lactation training to be able to support expressing in a way that maximises the mother's chances of establishing a sustainable milk supply, as well as to support other feeding choices that parents make. This should include ensuring there is emotional support provision for all

parents.

Specialist lactation support should also be available to those with low milk supply and to those who are having particular difficulties. This may include mothers with pre-existing factors such as breast surgery as well as those identified through regular expressing assessments. Assessment of milk volumes/delayed secretory activation around day three to four after birth may be particularly useful as this has been linked to long term lactation difficulties[91] but is potentially early enough for changes to have a positive effect.

Specialist support is often part of multicomponent studies or before-and-after quality improvement studies which predominantly show a positive effect on MBM feeding outcomes but cannot isolate the impact of specific elements[92]. It is the working group's consensus opinion that having access to specialist lactation support is extremely important throughout the neonatal care journey (for example through a neonatal infant feeding lead with specific additional lactation training, and ideally qualified as an International Board Certified Lactation Consultant – IBCLC).

Evidence	Evidence sources
Presence of a neonatal unit IBCLC was associated with increased breastfeeding initiation prior to hospital discharge, adjusted for maternal characteristics (OR 1.3).	Castrucci 2007 (cohort study)
Several before and after cohort studies in single units showed improved provision of MBM and increased human milk feeding at discharge with IBCLC support.	Hilditch 2019[92] & Mercado 2019[93] (systematic reviews)
Routine IBCLC assessment of all women increased any MBM from 74% to 80% and increased the volume of MBM brought to the unit by 29%, compared to IBCLC referral only for specific problems.	Hoban 2021[94] (cohort study)
Lactation consultant counselling service during and after admission did not increase duration or exclusivity of breastfeeding.	Pinelli 2001[95] (RCT)

Galactogogues should never replace high quality support for expressing milk. There is insufficient evidence to advise specific foods or herbal galactogogues. There is significant evidence that the pharmacological galactagogue domperidone increases expressed milk volumes by around 90ml per day[96], and this can be discussed with mothers who have already had good quality counselling on how to effectively express milk but have persistent low volumes. In the UK there is an MHRA safety warning[97] advising against the use of domperidone for indications other than nausea and vomiting due to concerns about cardiac arrhythmia. The Breastfeeding Network factsheet[98] has a thorough description of the safety evidence for healthy mothers with no risk factors for arrhythmia and may be useful to share with GPs who are asked to consider domperidone prescription.

9. Infant led approach to the transition to responsive feeding

Recognition of feeding cues and a structured approach

An infant-focused approach to the transition from tube to suck feeding is known variously as; cue-based feeding, infant or baby led feeding, infant driven feeding, co-regulated, attuned or responsive feeding. These systems define oral feeding readiness not by weight or gestational age but a combination of neurodevelopmental maturity, behavioural state organisation and physiological stability. Most of the evidence related to using these systems report on time to full oral feeds, and can benefit both formula feeding and breastfeeding babies. A qualitative systematic review identified three key facilitating themes to enable attuned breastfeeding – "being in closeness" (maximising physical connection), "being enabled to

breastfeed when their infant signalled" (maximising parental presence and privacy) and "staff support and interpersonal relationship"[42]. These factors enable a positive breastfeeding experience defined by trusting the body, being emotionally present and experiencing mutual positive responses[42].

"It was very positive that the health professional was so calm and encouraging but not too pushy and stayed in the background. It is important that they step forward now and then and give advice but at the same time let me try on my own."[99]

Avoiding or minimising bottles is an evidence-based strategy to improve breastfeeding outcomes – maximising parental presence during the transition to oral feeds is therefore very important. However, bottle-feeding expressed MBM is a choice that some families may want to discuss in reference to their family's priorities. Some parents may want to minimise direct breastfeeding through concern that this will delay discharge. However direct breastfeeding (high frequency, low frequency or none) was not associated with later gestational age at discharge[100] in a multivariable retrospective analysis. If families want to use bottles during the transition to direct breastfeeding then responsive/cue-based, paced feeding should be emphasised[101], with support to maintain milk supply and encouragement to keep offering the breast. Elevated Side Lying Feeding Position (ESLP, see appendix 3), causes fewer choking episodes[102] and, in one study, more stable physiology during feeds[103]. It is used for all bottle feeds in some units and for selected cases in others.

Intervention	Evidence	Evidence sources
Infant driven feeding – using infant behaviour to guide transition to oral feed	Responding to a baby's feeding cues to guide transition to suck feeding reduces time to full oral feeds (mean difference −5.5 days). Low strength evidence.	Watson 2016[104] (Cochrane review)
Avoidance or reduction of bottles	Avoiding bottles (through use of nasogastric tube or cup feeding) increases full breastfeeding at discharge home, three months and six months after discharge (RR 1.5, 1.6 and 1.6 respectively). Low and moderate strength evidence. Having the first oral feed at the breast is associated with increased likelihood of breastfeeding at discharge (OR 8.7). Any direct breastfeeding at discharge is associated with increased likelihood of breastfeeding at six months of age (OR 5.5).	Collins 2016[70] (Cochrane review) Casavant 2015[56] (cohort study) Pinchevski-Kadir 2017[105]

Variation in approaches to transition to breastfeeding

There is currently limited robust evidence to support or refute widespread implementation of the following interventions and the toolkit working group would encourage further research in these areas. However, these strategies may be useful as part of an individualised care approach, as long as clear emphasis is placed on removing barriers to maternal presence to be with the baby to facilitate direct breastfeeding. Parents should be supported to make an informed choice.

Home tube feeding is established in many units, which transfers the last phase of the transition to oral feeding from neonatal units into home settings. There is some evidence that this protects breastfeeding establishment, is safe, cost saving and valued by families[106,107].

Cup feeding is a choice that some families may want to discuss. This should always be an informed choice,

ensuring parents are aware that although cup feeding has been shown to increase breastfeeding rates when compared to bottle feeding in most of the limited number of studies[107,108] concerns have been raised[109-111] over staff and parental acceptance of cup feeding, risk of aspiration and negative impact on the length of stay. These factors may relate to the context in which they are used and the level of staff training as one study showed no difference in feed length and improved physiological signs[108].

Nipple shields have been shown to increase milk intake by preterm and term babies in some studies but to decrease milk intake and lengthen feeds in other settings[112,113]. Potential negative effects on breastfeeding may be ameliorated by effective support[114]. It may therefore be sensible to use nipple shields as a later step rather than first line and they must be used in combination with support for positioning and attachment. Support should also be given to ensure the correct size of nipple shield is used for a good fit that maximises milk transfer.

Test weighing is not commonly used in the UK. This is the practice of weighing a baby on very accurate scales before and immediately after a breastfeed to estimate intake. There is minimal evidence that test weighing has a positive effect on maternal or infant outcomes[115–117], although one observational study has linked the use of test weighing to higher exclusive breastfeeding rates at discharge[69].

10.Successful MBM feeding after discharge

Supporting parental knowledge and confidence

QI in this area should focus on the importance of post-discharge support and the importance of building relationships with those who will provide support post-discharge, ensuring these settings integrate care for families. Preparing parents for discharge starts from admission – for example, involvement in all aspects of care and decision-making builds parental confidence. There is very little evidence available in this area – it is the working group's consensus opinion that the following areas be considered for quality improvement work:

- **Seamless transition of feeding support** from the Neonatal Unit into the community. The community team should understand the challenges of prolonged mechanical expression, transition to breastfeeding[42,118–120] and the psychological impact of long-term Neonatal Unit care on parents, including guilt and grief associated with feeding experiences. Strong cross-setting integration, such as early and prolonged contact of health visitors during admission, allows families to build supportive relationships across the admission/discharge divide[121], ensures a good understanding of the families' particular experiences and how to continue building confidence in responsive feeding at home[122]. Approaches to post-discharge weight gain and use of breast milk fortifier should be agreed between both settings and be supportive of ongoing direct breastfeeding.

- **Neonatal community outreach teams and health visitors** are likely to form the core of post discharge support. Health visitors can offer longer-term support, as well as a broad understanding of local support options and parental mental health. Preterm-specific feeding support may be challenging for health visitors as it is only a small part of their workload and training[123]. Including health visitors in specific infant feeding training may be a beneficial strategy. Good communication between both teams to provide a coordinated and consistent approach requires specific training and reduces parental stress[123]. Appendix 5 provides an example pathway for health visitors. Neonatal outreach teams and the families on their caseload are likely to benefit from continued access to specialist lactation support (such as an IBCLC).

- **Education and support:** Parents may not be able to integrate knowledge well when they are under stress. Education and support are likely to need repeating, both before and after discharge, reinforcing

the need for a coordinated approach. Professionals should support families, and ensure families feel listened to, with opportunities to voice their concerns and wishes. Education and support should be tailored to each specific family's needs and be delivered respectfully. Notably where parents have decided to pursue feeding options other than exclusive breast or breastmilk feeding, avoid repetitive conversations about this and provide information, education and non-judgemental support according to their needs.

- **Peer support**: Evidence shows that peer support must be carefully designed to meet the needs of the population receiving it: the ex-preterm family. Peer supporters will need sustainable supervision and training. Quality Improvement strategies could include ensuring that peer supporters on neonatal units have specific neonatal experience or training and can support during the neonatal stay and also continue in the community as part of the wider peer support team post-discharge.

Intervention	Evidence	Evidence sources
Specific education programmes	A structured five-session lactation education programme near discharge increased exclusive breastfeeding at 4 months from 16% to 73%.	Ahmadi 2016[124] (RCT)
	A QI project focusing on structured perinatal counselling, daily family counselling and peer support was associated with an increase of any MBM at discharge from 48% to 57% to 77% in successive PDSA cycles.	Bagga 2020[125] (cohort study)
	Proactive daily telephone contact with NICU staff for two weeks after discharge did not affect breastfeeding rates 8 weeks later but did reduce parental stress.	Ericson 2018[126] (RCT)
Peer support	Support from a trained peer counsellor with breastfeeding experience, within 72 hours of birth and for up to six weeks (by telephone after discharge) increased provision of any MBM at 12 weeks of age (OR 2.8).	Merewood 2006[127] (RCT)
	The components of breastfeeding peer support programmes that are best correlated with good outcomes are addressing the perceived needs of the target population; buy-in from healthcare professionals; and that the peer supporter is accessible, proactive and approachable.	Trickey 2017[128] (review)

Other Considerations

- **Donor human milk** when compared to formula use in situations where no MBM is available, is associated with reduced NEC rates[129] and can be better tolerated than formula milk[130]. Where it is used in conjunction with effective lactation support it may increase MBM provision early in the neonatal journey[131] and at discharge[132]. Also see the BAPM Framework for Practice on donor human milk[133].

- **Breast milk fortifier** use shows significant geographical variation in the UK. The toolkit working group note that some units continue using breast milk fortifier after discharge[134], particularly in combination with home tube feeding programmes that may result in earlier gestational age at discharge. This could potentially be protective of long-term breastfeeding due to reduced motivation to use formula in response to slow weight gain[135]. Early randomised evidence is suggestive of medium term benefit in growth, neurological outcome and breastfeeding duration[135,136].

Overview of the Improvement Journey

How to use this toolkit

This toolkit is not intended to be read as a guideline, which mandates a standard improvement journey for all units. Instead it is a practical resource from which units who wish to improve MBM availability for preterm babies can select the most suitable interventions for their particular context. For example, there are some units that may achieve high proportion of babies receiving MBM on day 14 with strong early lactation support but they may not able to maintain this by the time of discharge. The improvement solutions for each unit may be different. Individual units are encouraged to interrogate their own processes and outcomes in order to select QI interventions which are best suited to their context. When designing QI projects, teams should ensure there is parity in this for all neonatal families on the unit, whatever their feeding choices.

Phase One: Define the Problem

Where are we now? – Baseline & Benchmarking Data

It is important to understand your local data, and to benchmark where possible in the context of regional, national and international standards (NSQI 11,12) observing any changes over recent years. To achieve this your team should understand how to look at your local data, what questions to ask and where to access benchmarking data such as Badgernet National reports and comparison charts, the network data dashboards, NNAP Online as examples. Finally, being able to convey these data to the wider team clearly and concisely will facilitate a stronger commitment to the implementation of quality improvement interventions. It is recommended that those doing QI work should assess all their process & outcome measures through the lens of inequality, and to identify whether specific process or outcome measures are needed to specifically try and understand the impact of health inequality on infant feeding.

1. **Process Measures**
    a. **Infant & family based:** These could look at proportion of eligible infants with evidence of:
        - Parental involvement in care (such as Badgernet data on documentation of parental presence on ward rounds and early parental communication) or frequency, and total time of skin to skin contact provided on set days (eg day 7 and day 14)
        - Documentation of discussions & decision-making regarding feeding choices for the infant (such as Bliss Baby Charter evidence, BFI audit or Badgernet data)
        - Delivery of a programme of sensory-motor-oral stimulation and non-nutritive sucking (local data and audits)
        - Documentation of volume of milk produced (24 hourly amount) at set intervals: eg: day 7 and/or 14
        - Documentation of breast feeding/expressing assessments pre & post discharge
        - Discharge planning meetings with health visitor attendance
    b. **Unit based:**
        - **Education**: Percentage of maternity and neonatal staff who have received validated training (eg BFI standards & regular updates)
        - **Feedback** from parents about feeding support during their neonatal unit stay and post discharge (eg access to breast pumps, lactation support) We would suggest that as well as specific feedback on breastfeeding support, parents are asked to feedback on feeding support in general also, to ensure equity in experience is being maintained. It is also important to consider different methods for getting feedback to ensure it is representative of the demographic profile of the area your unit serves, as well as the range of neonatal experiences.

2. Outcome Measures

- Percentage of babies <34 weeks gestation at discharge who receive any of their mother's milk at day 14 and at discharge (NNAP measure)
- Percentage of babies <34 weeks gestation who receive formula milk at discharge
- Percentage of babies <34 weeks gestation who are exclusively breastfeeding at discharge, and at 3 months and 6 months post discharge breastfeeding
- Data fields for implementing UNICEF BFI[137] can enable effective monitoring of progress within the standards

It may also be useful to ask:

- Are your data both accurate and complete? Do you have missing data?
- How has your data changed over time?
- How does your data compare with other units in your network and nationally?

How did we get here? Brainstorming Barriers and Enablers

Barriers and Enablers

Barriers are often found within units' staffing structures, organisational guidelines, clinical processes and resource availability. Implementing national QI programmes such as BFI & Bliss Baby Charter accreditation will support the infrastructure required to overcome these barriers. Please also see the work done by SISCC in Scotland looking at barriers and enablers to breastfeeding and kangaroo care in NNU[138]. Table 1 gives some examples to help units with this process.

Table 1: Barriers and enablers for core elements 6-10

Barriers	Enablers
6. Positive oral touch and non-nutritive sucking (NNS)	
Lack of supportive NNS **equipment and resources** on the unit	Readily available information & NNS equipment/resources for staff/parents Provision of appropriate size and shape dummies and mouthcare equipment
Reduced opportunities for positive oral touch due to barriers to **involvement of parents** in their baby's care Physical barriers such as incubators, respiratory support, lack of chairs for parents at the cotside, lack of overnight **accommodation** on or close by the unit Lack of **cultural awareness** among staff about the importance of maintaining modesty for some mothers, and the implications this can have for breastfeeding (e.g. lack of privacy screens) Lack of staff and parent **confidence** in handling baby. Parents not supported to maximise **skin to skin opportunities** Baby not given opportunities to initiate NNS at the	FICare and Developmental Care **guidelines** supporting hands on parent interactions eg tube feeding whilst skin to skin, supporting baby to have opportunities to be near the breast Regular **teaching sessions** for parents and staff Access to fully integrated/resourced & relevant **Allied Health Professional** team Signposting & supporting parents to access locally available or nationally available support and ensuring anything your unit provides (such as **meal vouchers/access** to **accommodation**) is discussed with parents routinely from admission

breast or during supportive NGT feeding	
7. Establishing a good milk supply	
Ineffective use of pumps: cycles , vacuum, shield size leading to breast **trauma, pain** and low volumes **Insufficient pumps** on NNU or PNW	Supporting parents to use the pump effectively & ensuring a **selection of breast shields**/funnels are always available Comfortable and **private spaces** to express (remembering the cultural importance of privacy and maintaining modesty for some women) Offering parents the facilities to express next to their baby could minimise the conflict between the importance of being with their baby and expressing frequently
Staff unsure of the appropriate questions to ask when doing an expressing assessment (which may delay early intervention)	**Communication skills** training for staff to enable support to be gentle and encouraging rather than judgemental, consider when to provide families with information and support for alternative feeding methods if they have expressed that this is what they want to do
8. Timely response to challenges around lactation and breastfeeding	
Professionals uncertainty around response to challenges	Infant feeding leads choose weekly **"bite size teaching"** topics, based on data highlighting areas of focus to improve outcomes
Low milk supply - perceived and actual	Proactively identify mothers **at risk** of low milk supply using recognised tools (see appendix 3) Introduce an **expressing log** to monitor volumes and trigger support in a timely way. Highlight any MBM is beneficial – every drop counts
Long-term parental **emotional/physical/economic strain**	Target anxiety reduction and encourage self-care Signpost to **social/psychological support** Recognise external pressures & suggest flexible plans to reduce parental stress & anxiety
Lack of adequate **parent facilities** Improving facilities wholesale sometimes requires significant investment	Develop a **Parent Advisory Group** to support enhancement of parent facilities/ Embed FICare/ BFI/ Bliss Baby Charter accreditation Units should collate any evidence from their QI programmes suggesting the need for improved facilities and proactively share with senior decision makers to ensure it is considered as part of any funding bids or case for support development
9. An infant led approach to the transition to cue-based and responsive feeding	
Unrealistic staff and parent **expectations** when assessing baby's maturity of oral feeding skills.	Supporting time at the breast before any expectation of milk transfer
Reluctance to move away from scheduled volume	Empowering parents/staff to observe and

driven feeding to cue-based modified responsive feeding Lack of staff/parental knowledge **to recognise signs of effective breast milk transfer** (sufficient or insufficient) and the role of top up feeds, how these are given and impact on breast feeding	understand baby's emerging behaviours, feeding cues and abilities Instigate qualitative **oral feeding assessments** (BFI/local/research-supported tools[139]) facilities to enable parents to remain physically close to their baby
Lack of staff knowledge of appropriate **developmentally supportive bottle feeding**	Informed decision and parental **consent** for use of bottles and/or continued supportive tube feeds Develop individualised **paced bottle feeding plan** considering teat flow and elevated side lying feeding position as appropriate (see appendix 3)
10. Successful breastfeeding after discharge	
Attending multiple/frequent MDT medical reviews/appointments	**Cluster scheduled appointments** together, or run a dedicated MDT post discharge clinic, including specialist feeding support Offer **virtual feeding support** to reduce travel
Unrealistic **expectations** of feeding and growth patterns once home	Provide information and realistic expectations for home. Empower parents & staff to gain confidence in signs of effective feeding Reinforce the long-term protective benefits of MBM feeding for both mother and baby If parents have made an informed choice to mix-feed or not breastfeed, they should receive continued information & support
Health visitor not educated about nature of infant feeding experiences in prematurity Lack of peer support and community networks who understand the premature experience	Health visitor and community team support can be a powerful enabler, especially when combined with **peer support and social support** networks.
Partner (and/or other family/friends) who want to "help" mother by feeding the baby, or feel excluded or helpless because they can't feed the baby.	Include partner (and/or other family friends) when providing information and support for breastfeeding[140]. Explain that for them, feeding the baby may not be the best way to help the mother, and explain **other ways they can help** by supporting and facilitating breastfeeding. Explain how bonding can take place without feeding, such as skin-to-skin contact and performing other caring tasks such as bathing and sling carrying.

How did we get here? QI tools

There are many tools to help your team understand your current practice and identify how to improve (Figure 6-9). You do not need to use all of these tools but should explore which of these tools works best for your team[7]. All of these tools are explained further and templates available in the BAPM QI Made Easy pages ('Investigating your Current Practice')[141] Using one or more of these tools will identify potential areas for improvement and ideas for change. These ideas can be pulled together into a driver diagram to apply a clear and organised structure to your project, implementing evidence-based strategies within a multidisciplinary team setting, ensuring that on a single page one can communicate the SMART aim, the primary and secondary drivers that can help achieve the aim as well as various change ideas that can be tested using appropriate measures and implemented in a sustainable way. Change ideas can also be put together into 'bundles' for improvement which seem to enhance their collective effectiveness.

Figure 6. An example of a force field analysis for MBM feeding at discharge

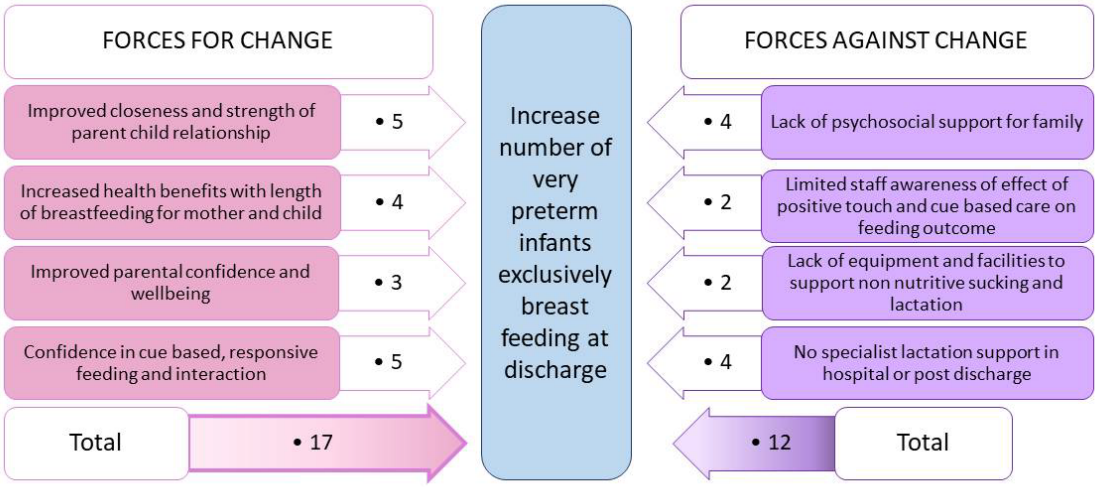


Figure 7. An example of a fishbone diagram for sustained expressing

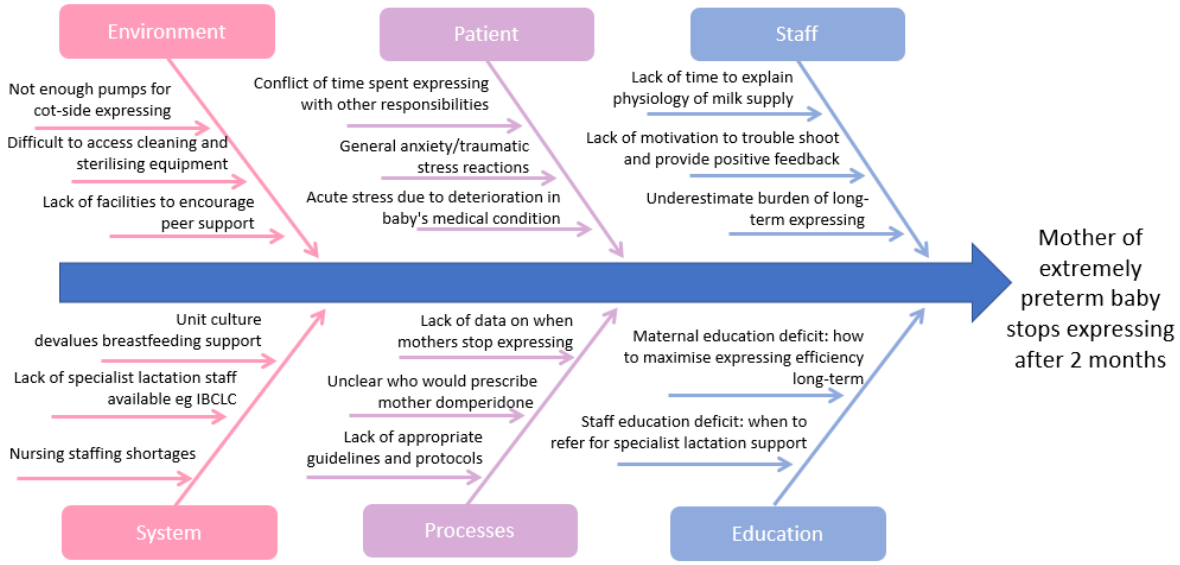


Figure 8. Process mapping for the MBM journey for a preterm baby and their family. Some of these elements along the neonatal journey can be incorporated into checklists to ensure specific and timely focus on these various aspects and to drive improvement

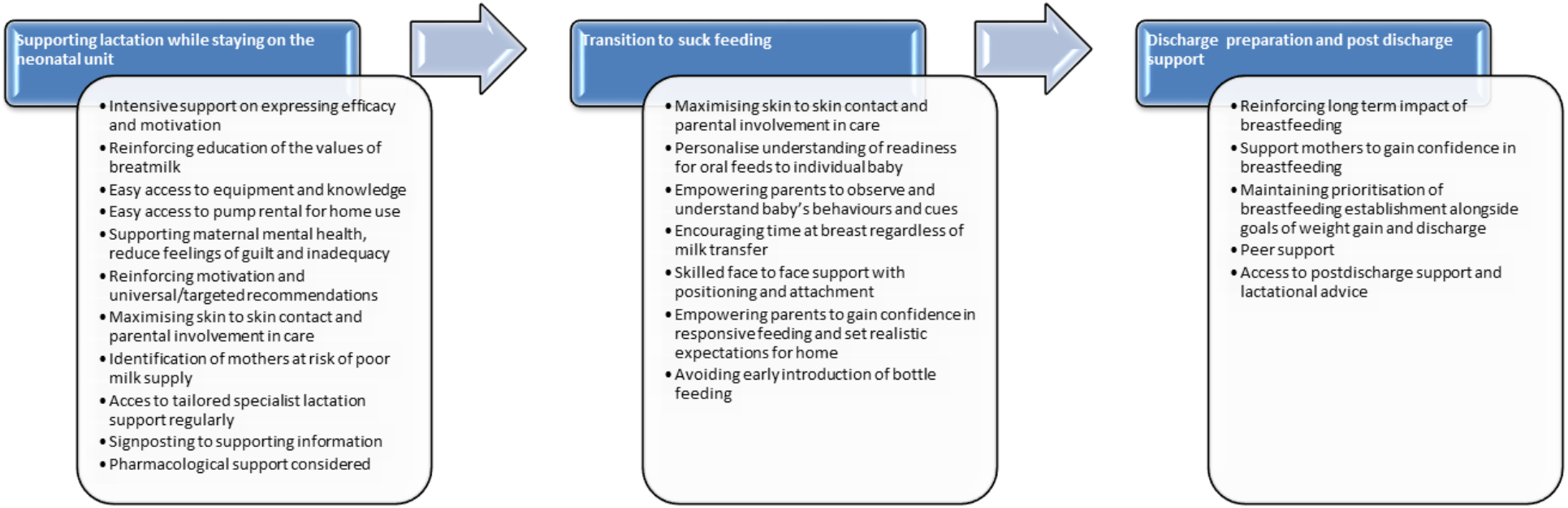
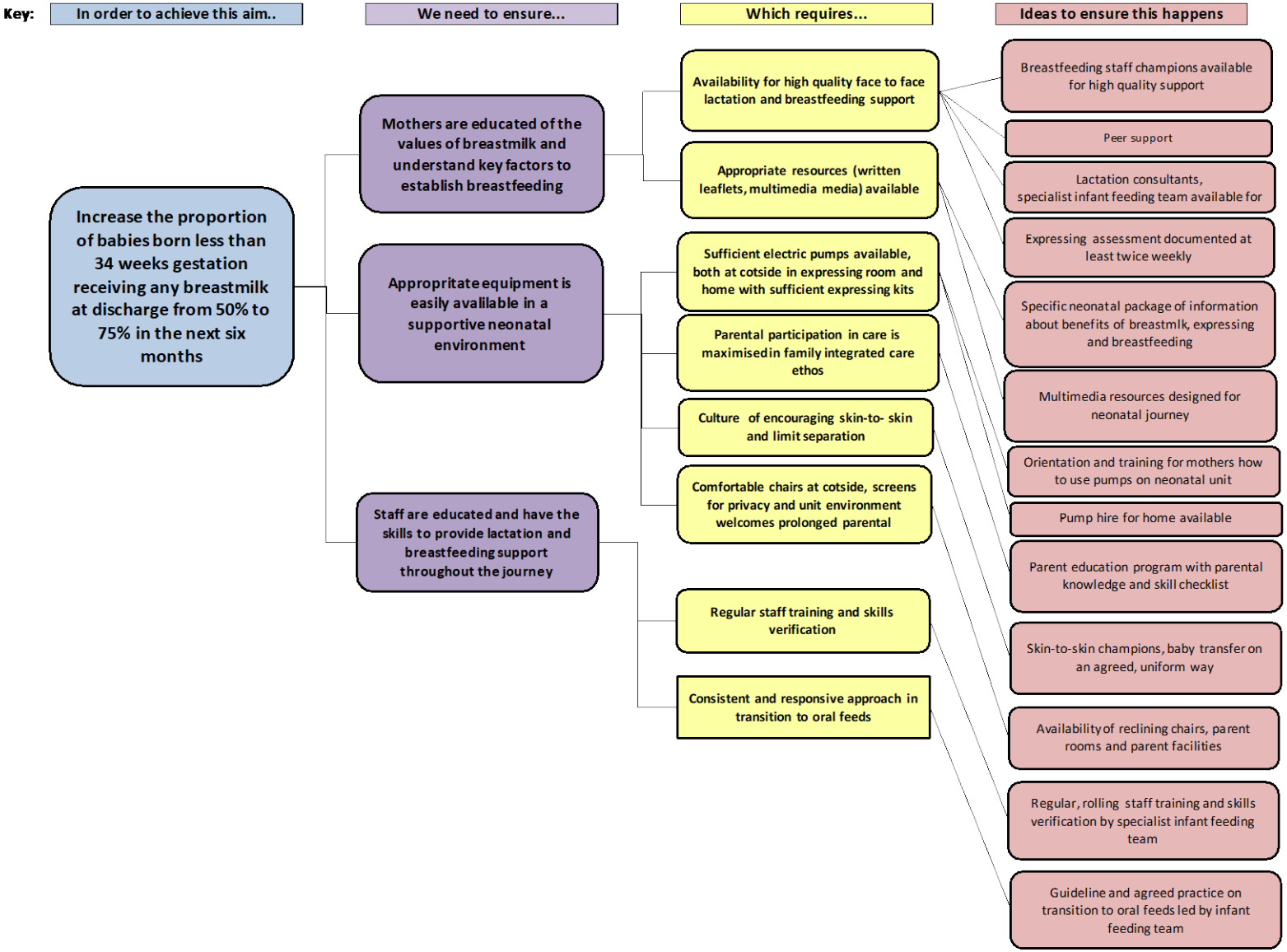


Figure 9. An example of a driver diagram for MBM feeding at discharge



EXAMPLE

Phase Two: Develop a Shared Purpose

Developing a shared purpose across team or organisational boundaries can be challenging. One of the key components to a successful project is having an implementation team that has representation from all relevant teams and from both hospital and community settings to ensure commonality of language and a philosophy of working toward shared goals.

Engaging your multidisciplinary team

A team that is engaged, resilient, enthusiastic and committed to working together will create the right culture for change[7]

Teams should ideally be around 6-10 members and include:

- A Project lead (could be from any part of the multidisciplinary team)
- Multidisciplinary representation including neonatologists, paediatricians, neonatal nurses including outreach teams, infant feeding team, speech and language therapists, specialist dietitians, occupational therapists, psychologists, Health Visitors, GPs & peer support workers.
- Parents with differing experiences of feeding & feeding support. Consider including your local Parent Advisory Group and/or Maternity Neonatal Voice Partnership.
- Peer supporters
- People with expertise in QI and data analysis

Phase Three: Plan and Implement Changes

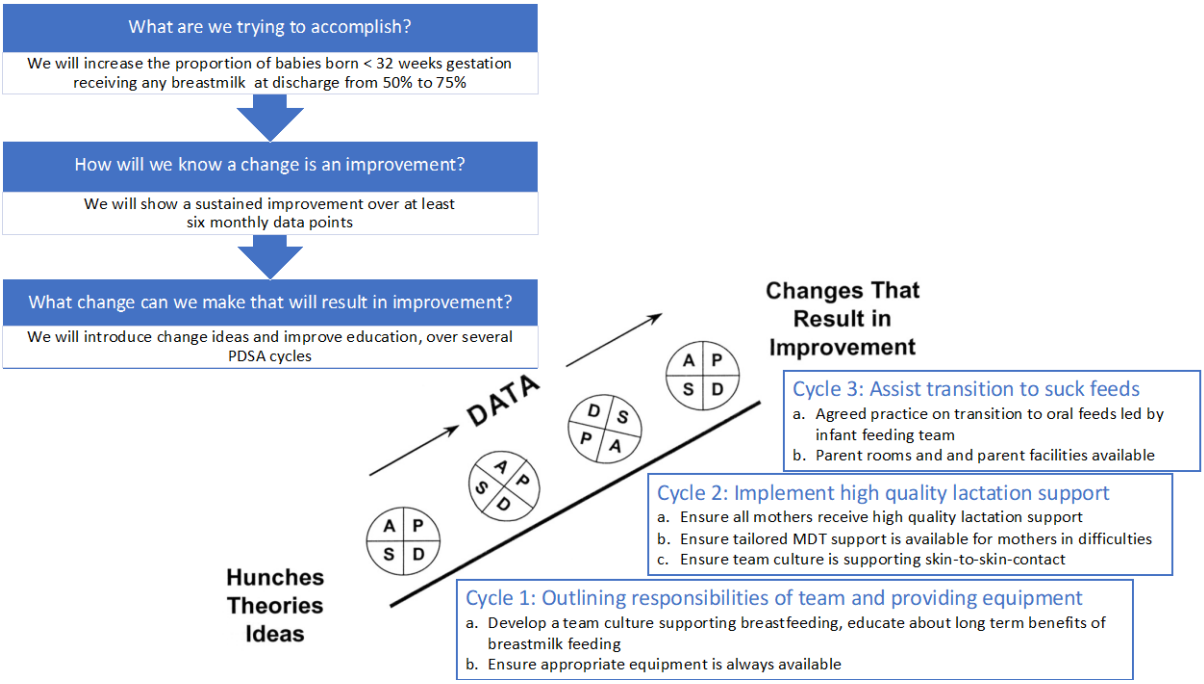
Project Charter

It can be useful to construct a Project Charter at the start of this phase to detail your proposed improvement, including the resources required and the potential benefits to patients. NHS Improvement[142] and NHS Education for Scotland[143] have examples.

The Model for Improvement

For each change idea, a PDSA cycle can be used. More information on using the Model for Improvement can be found on the BAPM QI Made Easy pages ('Planning your Change Idea')[141].

Figure 8. Example Model for Improvement to improve MBM feeding at discharge.



Learning from parents and other stakeholders

It can be helpful to speak to other units about how they have maximised MBM feeding and supported continued breastmilk feeding beyond discharge. Units who have successfully achieved continued MBM feeding to discharge can be identified from NNAP online[3]. Parental input and consultation is vital. Users of this toolkit should seek to engage parents from the initiation of the project, with a particular focus on parents from minority groups and those who traditionally have the lowest MBM feeding rates (such as younger mothers from lower socioeconomic backgrounds). The following examples, shared by teams and parents, may be useful.

"I knew the Outreach team was available Monday to Friday with advice, they were one phone-call away. This helped a lot! I rang the team many, many times when I struggled with breastfeeding. This may be something the Health Visitor or Breastfeeding support groups could do. Improving GP knowledge about breastfeeding issues would really help too."
Dana, mother of baby Elias born 29 weeks

"The BFI breastfeeding assessment forms that we have adapted have been useful to engage mothers in what to expect when their baby starts to feed at the breast. It highlights responsive feeding and promotes instinctive feeding behaviour. This not only helps mothers but also staff who have been used to more regimented feeding regimes."
Cathy Budd, Infant Feeding Team, Southmead NNU, Bristol

"If I had questions, they could answer them and they were very attuned. I thought the whole conversation was modelled after me. . . like the questions I had and what problems I had and so on. Then there was the encouragement. Sometimes you might not be so eager to continue breastfeeding after so many months of tube feeding and pumping to just get that encouragement, a little pat on the shoulder"[40]

"I felt that having visits from both teams (NCOT & Health Visitor) at regular intervals made our transition from neonatal care less stressful. Our health visitor knew our baby well which was important to us after having such a difficult neonatal journey."
Parent, Worcester NNU

"Weekly Nutrition MDT ward round is an opportunity to provide a consistent approach to progress Baby's breast milk feeding journey, empowering mum to lead on responsive feeding. It also ensures referral into community services occurs in a timely manner facilitating follow-up "
Lynette Forsythe, Neonatal Dietitian & Jo Marks, SALT, St Mary's NICU , Manchester

"'Plymouth Breastfeeding Mums' is a Facebook support group for local breastfeeding mums seeking advice, friendships and discussion. The group is made up of experienced peer supporters, the local infant feeding lead and peers. It allows women to seek online support, virtual 1:1 sessions with a peer supporter, and access information about local face-to-face groups. There is a wealth of experience in the group, including many mums of preterm infants, and mums are able to link up with others with similar journeys."
Kate Westwood, Peer Supporter & Aimee Miller, Infant Feeding Lead, Plymouth

"My son was born at 33 weeks, I was with him in the hospital dealing with a very stressful situation, with no idea of what support would be available once we were discharged. I received a call off my Health Visitor, who stayed in weekly contact throughout the whole time my son was in hospital and it was so helpful. Once we were home and the Health Visitor came to visit, she didn't feel like a stranger and was fully aware of the journey we had been through which made me feel relaxed and comfortable in contacting them with any questions/concerns"
Jennifer, mother to Oliver

Phase Four: Test and Measure Improvement

In this phase, improvements are tested, reviewed and re-tested through a series of PDSA cycles to decide what works and what does not i.e. is the intervention producing the impact that we expected it would?

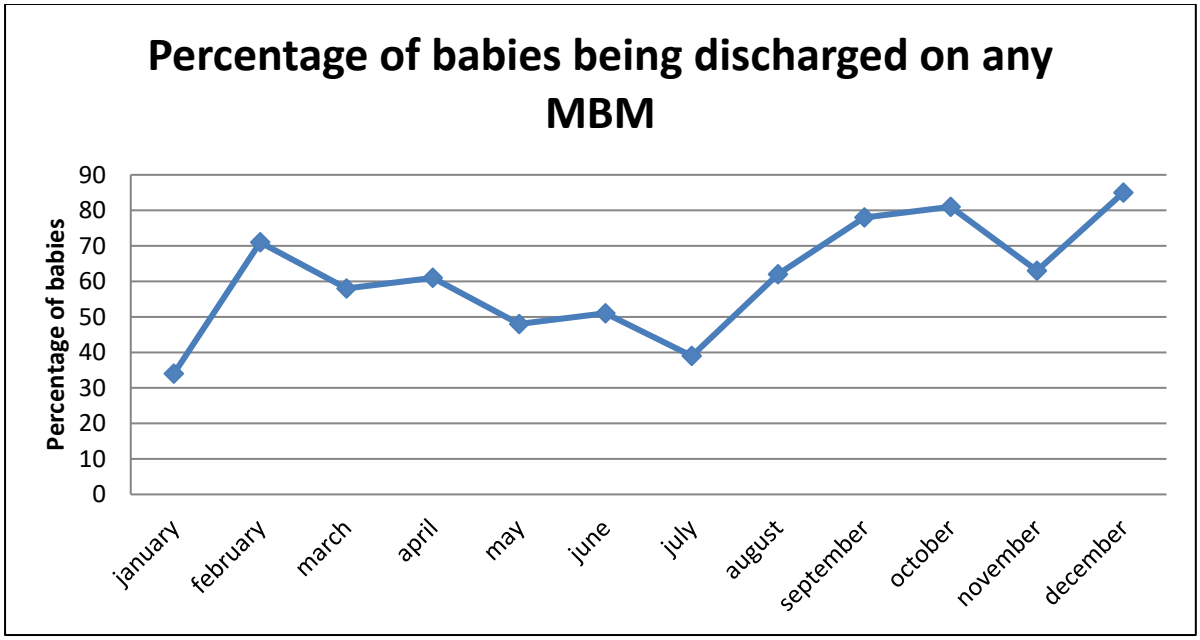
Data collection

Measuring for improvement is different to the data collected for research or to prove whether clinical interventions work or not. It is important that you collect the right data for your project[7]. In terms of actual metrics, any QI work aimed at improving a preterm infant's transition to breastfeeding/MBM feeding ought to focus on the types of measure in Phase One. Data related to ongoing MBM feeding after discharge from hospital and neonatal outreach services may pose additional challenges. A detailed overview of measurement strategies is beyond the scope of this toolkit. Some resources from the Institute for Healthcare Improvement[144] and NHS Institute for Innovation and Improvement (video[145] and How-to Guide[146]) are helpful.

Data analysis and display

There is growing evidence to highlight that visual display of data within working spaces and discussion about measurements using 'huddles' and similar processes is more effective than traditional meetings. All of the options for analysis detailed below are explained in the BAPM QI Made Easy[141] pages ('Interpreting your Data'). For in-depth understanding of run charts and SPC charts please see the NHS Improvement website[147].

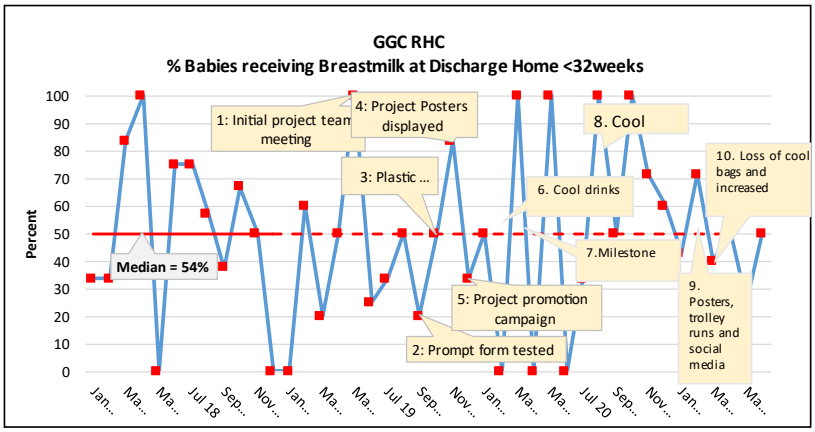
Figure 9. Example of a Run Chart



EXAMPLE

Figure 10. Example of a Run Chart

Monthly run chart for discharge feeding demonstrating project actions



Phase Five: Implement, Embed and Sustain

This phase involves the wider implementation of improvements such that change becomes embedded in routine practice throughout the system and is sustained with governance arrangements.

Spread

This can involve formal methods such as *dissemination* that includes presentations, publications, leaflets, posters, learning boards, social media, some of which may have limited reach within your department and may be better disseminated via network/LMS meetings and GIRFT benchmarking mechanisms; or informal methods of *diffusion* where word of mouth, champions and opinion leaders can accelerate your message. Consider carefully what is required for the embedding of changes within your service.

"We have a Countywide Breastfeeding Strategy Group, where feeding leads within Health Visiting, Neonates, Maternity, Community Breastfeeding Support, Paediatrics and GP discuss how to coordinate and integrate breastmilk feeding projects. It builds a great sense of community and joined up thinking."
Ilana Levene, Neonatal Registrar

Sustainability

The ability of a service to implement and sustain change is dependent on various strengths and weaknesses of any one project. A useful tool to do so is the NHS Sustainability Model (NHS Improvement: Sustainability Model and Guide)

Barriers to sustained improvement

During a QI journey, it is not unusual to find the magnitude of improvement lessen over time. It is important to understand why this happens, such that solutions can be tailored to the problem. Different approaches will be effective for different people and different situations. Ensure barriers are explored with all stakeholders, especially the multidisciplinary team that is not easily 'accessible' such as health visitors, GPs and community peer support networks. Education is a key element of overcoming barriers particularly within an interactive forum; using opinion leaders to influence others within your staffing structure; reminder systems to prompt clinicians; and ensuring feedback of data to staff in a format that they find useful; all these can help to reinvigorate and embed your changes for improvement[7].

"Gold *[UNICEF BFI Gold award]* is achieving sustainability, the award celebrates excellent and sustained practice in the support of infant feeding and parent- infant relationships.

Success was only possible with total staff involvement and ownership, supported by a strong leadership group. At the centre of this are the parents, who are viewed as partners in their baby's care. The changes that have taken place over many years have not gone without problems and at times strong resistance. However, staff, through education and passion for our unit, embraced the changes, which in turn enhanced personal development. We have learned to stop apologising for what we are not and celebrate what we are: GOLD."
Tracy Lockwood, Harrogate & District NHS Foundation Trust Special Care Baby Unit

Parental Feedback

Never underestimate the power of patient stories to motivate and reinvigorate a team to implement change. Ask parents in your service to supply their stories of their journeys with the healthcare team and other parents. It is important that less positive experiences are also reviewed by the team – this does not have to be a negative or demoralising process. It can help staff to understand what positive improvements could be made or identify barriers that the unit was not aware of. This may lead to reinvigorated thinking about how to improve the existing QI model, for example, and motivate staff to address these needs. Examples are shown here (with thanks to the parent representatives of this working group):

"Elsie was born at 26+2, neonatal care was a completely new world to us. Breastmilk feeding was one of the most difficult parts about her prematurity –even in the depths of frustration, disappointment and hopelessness I always knew that I would do whatever it took to provide her with breastmilk. I knew the value of breastmilk to a newborn, but now it seemed even more important. I knew every drop of milk I could give her was vital to her survival, her development and her ability to fight off infection. As a mother who could not hold or care for her baby I did the only thing I could and expressed every 3 hours, day & night.

Looking back I don't remember ever thinking about the journey of transitioning from tube to breast feeding, I didn't even know if it was possible and I was too scared of the answer to even ask the question. I found expressing incredibly difficult. I was pumping day & night at hospital and home with equipment that didn't seem up to the task and without a child to stimulate the flow. Transitioning to breastfeeding was probably the most stressful part about our whole journey; it took almost 4 weeks to establish a 'good latch' and to feel that she was feeding effectively. Julia, our breastfeeding nurse, sat with us every day and came up with the plan to support the transition. It was a very slow process, and as we approached her due date it was like a switch had been flicked, we put her to the breast and she had her best feed yet. The feeding tube was removed and she never looked back. Having never considered the possibility of breast feeding at the beginning of our journey, to battling through those weeks trying to establish breast feeding, it truly felt like an absolute privilege to be able to finally feed her.

On our very last night in hospital we were given our own room in SCBU and we spent a blissful night together, just the two of us, feeding on demand and enjoying lots of skin to skin. After the trauma of the previous 3 months it is difficult to explain how precious this moment was to us.

Our breastfeeding journey came to an end when she was 18months old. As heart-breaking as it was to stop, I am so proud of her for never giving up, for showing us that even when everything is against you, you can find the strength inside to keep going and to succeed."

Catriona, mother to Elsie, born at 26 +2 weeks gestation

"My son was born at 27+5 and I felt very determined to breastfeed him after learning about the importance of the antibodies for premature babies. I felt like this was something as a mother only I could do. Having a baby in the NICU can make you feel quite helpless with their care, so this really spurred me on. I started to put him to the breast every day from as early as 32 weeks' gestation, sometimes he would latch awkwardly for one or two seconds and sometimes not at all, I saw this all as progress and tried not to get disheartened. Day by day this improved and eventually we were able to drop a tube feed.

A week before expected discharge home, I roomed in at the NICU accommodation and managed to establish night feeds, I took his lead but making sure he didn't sleep longer than 3 hours without an attempt to feed. I found feeding on demand so much easier than expressing (it's much easier to wake to a crying baby than a pump).

Going home my son had lost a bit of weight but I didn't panic as I knew he was feeding well and had only been off the fortifier a week. I found support in another mum who I made friends with during our NICU stay who was also breastfeeding, it was great to chat through issues with someone who was going through a similar journey at the same time.
I was keen to chat to a mum whose baby had gone home on oxygen, so I posted on my local breastfeeding Facebook page to ask if anyone had breastfed a baby on home oxygen. I managed to get in touch with a mum who had. I wanted to know how realistic exclusive breastfeeding on home oxygen was, it turns out it was completely possible, again with realistic expectations of normal baby behaviour. This really reassured me and made me feel at ease. My son was on oxygen for 8 months and it didn't affect his breastfeeding or latch at all"

Mother of 27 week preterm baby

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146. NHS Institute for Innovation and Improvement: The How-to guide for measurement for improvement. https://www.england.nhs.uk/improvement-hub/wp-content/uploads/sites/44/2017/11/How-to-Guide-for-Measurement-for-Improvement.pdf
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Appendix 1. Members of the Maternal Breast Milk Toolkit Group

Chair: Sarah Bates	Consultant Paediatrician & Neonatologist, Great Western Hospitals NHS Foundation Trust, Swindon Quality Lead, British Association of Perinatal Medicine PERIPrem Operational Clinical Lead, WEAHSN, SWAHSN
Annie Aloysius	Clinical Specialist Speech and Language Therapist (Neonatology) & IBCLC, QCCH & St Mary's Hospitals
Gillian Bowker	Infant Feeding Advisor, NHS Greater Glasgow and Clyde
Cathy Budd	Infant Feeding Specialist Nurse & IBCLC, North Bristol NHS Trust, Bristol
Sara Clarke	Senior Specialist Neonatal Network Dietitian, West Midlands Neonatal ODN
Lindsay Cracknell	Parent Representative
Katharine Curren	Feeding Specialist Health Visitor & IBCLC. Community Children's Health Partnership
Aniko Deierl	Consultant Neonatologist, Imperial College NHS Healthcare Trust, London
Kate Dinwiddy	Chief Executive, BAPM
Cora Doherty	Consultant Neonatologist, University Hospital of Wales, Cardiff
Marcus Hook	Membership and Finance Coordinator, BAPM
Genevieve Howell	Parent Representative
Minesh Khashu	Consultant Neonatologist and Professor of Perinatal Health, University Hospital Dorset
Ilana Levene	Neonatal GRID trainee, Thames Valley and NIHR Clinical Doctoral Fellow, University of Oxford
Tracey Lockwood	Neonatal Sister, Harrogate District Foundation Trust
Jo Marks	Professional Lead for Speech and Language Therapy, Manchester
Lisa Parry	Infant Feeding Coordinator for Health Visiting, Cardiff and Vale University Health Board
Imogen Unger	Joint BFI Lead, Senior Specialist Neonatal Nurse & IBCLC, Evelina London Children's Hospital Guys and St Thomas' NHS Foundation Trust
Kate Westwood	Paediatric Trainee, University Hospitals Plymouth Hospitals NHS Trust
Nicola Williamson	Parent Representative

Parent Representatives were recruited with generous assistance from Bliss.

Additional stakeholders involved in consultation

NNAP
UNICEF BFI
British Dietetic Association - Neonatal Dieticians Interest Group
Bliss
NHSE Maternity and Neonatal Safety Improvement Programme
GP Infant Feeding Network
Neonatal Nurses Association
Royal College Speech & Language Therapists - Neonatal Clinical Excellence Network
Institute of Health Visiting
Lactation Consultants of Great Britain
Best Beginnings
Wales Breastfeeding Strategy Group
Scotland Breastfeeding Leadership Team
ALCI Ireland

Appendix 2. QI tools, standards and guidelines

BAPM Quality Webpages
Specific BAPM resources at www.bapm.org/pages/2-quality
Other QI resources at BAPM QI Signpost: www.bapm.org/pages/60-qi-signpost

Bliss Baby Charter. Principle 6 specifically relates to feeding:
https://s3.eu-west-2.amazonaws.com/files.bliss.org.uk/images/Baby-Charter-booklet-2020.pdf?mtime=20210104142806&focal=none

Institute for Healthcare Improvement
http://www.ihi.org/resources/Pages/default.aspx

UNICEF Baby Friendly Initiative
https://www.unicef.org.uk/babyfriendly/

EFCNI European Foundation for the Care of Newborn Infants
https://www.efcni.org/health-topics/in-hospital/breastfeeding-and-nutrition/

GLANCE Global Alliance for Newborn Care
https://www.glance-network.org/

Maternity and Neonatal Health Safety Collaborative
https://www.england.nhs.uk/mat-transformation/maternal-and-neonatal-safety-collaborative/
https://www.england.nhs.uk/wp-content/uploads/2020/08/20190308_Optimisation_v2.1.pdf

Breastfeeding Network
https://www.breastfeedingnetwork.org.uk/

British Dietetic Association handling breast milk guideline
https://www.bda.uk.com/uploads/assets/913a1f78-c805-42c1-8d85e37ca75e0fc0/2019sfuguidelines.pdf

UK Drugs in Lactation Advisory Service (use the search bar to search for specific medication information)
https://www.sps.nhs.uk

Appendix 3. Resources

Best Beginnings - Small Wonders. A series of films created to support families on the journey with their sick and premature baby.
https://www.bestbeginnings.org.uk/watch-small-wonders-online

Bliss Baby Charter
https://www.bliss.org.uk/health-professionals/bliss-baby-charter
The Bliss Baby Charter is designed to standardise high quality family-centred care across the UK, enabling units to audit their practices and develop meaningful plans to achieve changes that benefit babies and their families. The aim of Principle 6 'Feeding' is that breast milk expression and breastfeeding are actively promoted, and mothers receive appropriate information and practical support to achieve successful lactation. This principle aligns with best practice standards, including those outlined in BFI.
https://www.bliss.org.uk/parents/about-your-baby/feeding

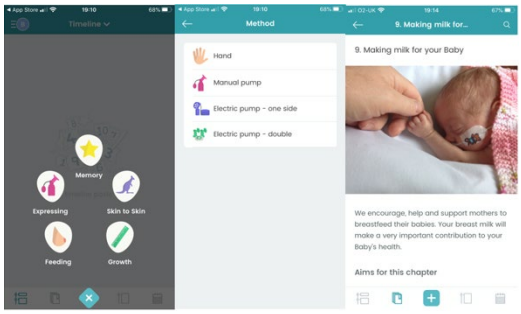
Californian Quality Commission
Chapter on human milk for VLBW babies, including specific recommendations and example of process/outcome measures
https://www.cpqcc.org/sites/default/files/Section%204_Human%20Milk%20%26%20Breastfeeding_Nutrition%20Toolkit_September%202018.pdf

La Leche League GB
https://www.laleche.org.uk/successfully-breastfeeding-premature-baby/

Elevated Side Lying Feeding Position (ESLP)
https://www.wmnodn.org.uk/wp-content/uploads/2020/05/ESL-May2020-A5-leaflet-final.pdf
https://www.wmnodn.org.uk/wp-content/uploads/2020/05/ESL-032019-poster.pdf

Scottish Improvement Science Collaborating Centre Evidence into Practice: Breastfeeding and kangaroo skin-to-skin care for babies & families in neonatal units
https://siscc.dundee.ac.uk/wp-content/uploads/2018/05/MCH-Final-Report-v7.pdf

The Integrated Family Delivered Neonatal Care (IFDC) App is a parent supporting mobile application developed by Imperial College NHS Healthcare Trust, available both on IOS and Android. Parents can log their expressing volumes easily in the diary then discuss with the neonatal team. There is also a chapter on lactation in the parent education materials. This QR code takes you to the IOS download.



UNICEF Baby Friendly Expressing Assessment Form
https://www.unicef.org.uk/babyfriendly/wp-content/uploads/sites/2/2016/10/Assessment-of-breastmilk-expression-checklist-2017.pdf

Domperidone as a galactogogue
https://www.breastfeedingnetwork.org.uk/wp-content/dibm/2019-09/Domperidone%20as%20a%20Galactagogue%20and%20breastfeeding.pdf

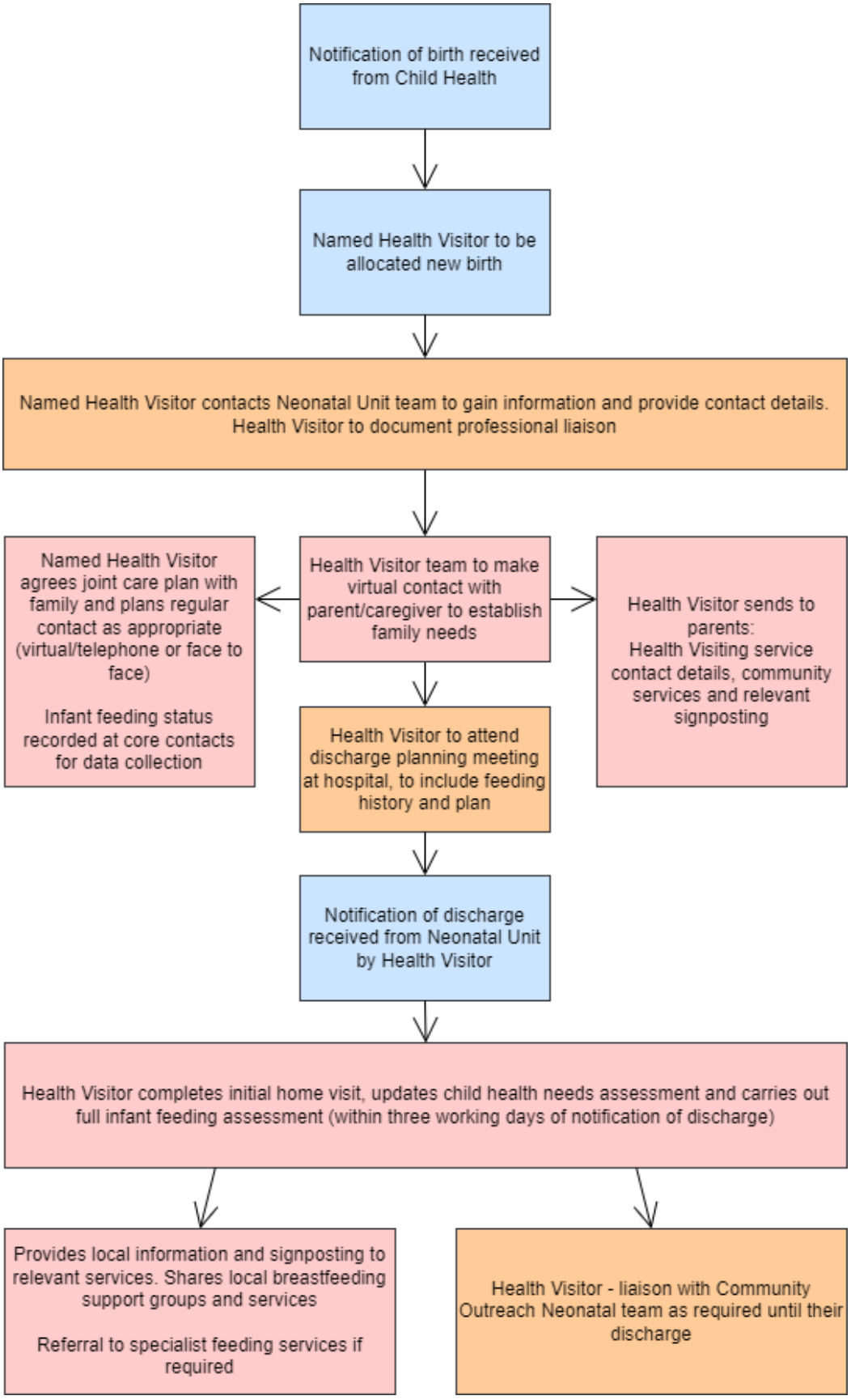
West Midlands Neonatal Network Feeding Journey Resources

The Feeding Journey parent leaflet:
https://www.wmnodn.org.uk/wp-content/uploads/2020/05/feeding-journey-leaflet-2020v2.-6-desktop.pdf

Non Nutritive Sucking parent leaflet:
https://www.wmnodn.org.uk/wp-content/uploads/2020/05/Non-nutitive-sucking-V6-2020.pdf

Breast Feeding Assessment sheet
https://www.wmnodn.org.uk/wp-content/uploads/2020/05/wmnodn-BF-Assessment-Jan2020WMNODN.pdf

Appendix 4. Pathway for post discharge Health Visitor follow up – Example of Best Practice



BAPM

Leading Excellence in Perinatal Care

This document was produced by the British Association of Perinatal Medicine (BAPM).

BAPM a membership organisation that is here to support all those involved in perinatal care to optimise their skills and knowledge, deliver and share high-quality safe and innovative practice, undertake research, and speak out for babies and their families.

We are a professional association of neonatologists, paediatricians, obstetricians, nurses, midwives, trainees, network managers and other health professionals dedicated to shaping the delivery and improving the standard of perinatal care in the UK.

Our vision is for every baby and their family to receive the highest standard of perinatal care. Join us today.

www.bapm.org/join

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