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INFANT FEEDING

The use of Breast Milk Fortifier in Preterm Infants by paediatric dietitians in the UK

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breast milk fortifier, dietetic practice, neonatal, preterm nutrition.

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Abstract

Background: Breast milk is the feed of choice for premature infants, although its nutritional composition is not always sufficient to meet their raised nutritional requirements. The addition of a multi-nutrient breast milk fortifier (BMF) to breastmilk is recommended; however, international guidelines on the use of BMF are inconsistent. The present study aimed to explore the use of BMF in preterm infants by paediatric dietitians in the UK.
Methods: A questionnaire was designed and sent to members of the British Dietetic Association neonatal specialist group (n = 100) using a secure online platform. Descriptive statistics were calculated.
Results: Forty dietitians completed the survey, all of whom used BMF. Local hospital BMF guidelines were available to 77.5% (n = 31). The most commonly used criteria for commencing BMF were: tolerating a feed volume of 150 mL kg^{-1} day^{-1} (72.5%, n = 29), a gestational age <34 weeks (67.5%, n = 27) and a birth weight <1500 g (60%, n = 24). The primary contraindication for the use of BMF was necrotising enterocolitis (NEC). The majority of respondents used standard fortification, with individualised fortification available to only 12.5% (n = 5). The most common indicators for discontinuing BMF were on discharge home (67.5%, n = 27), satisfactory growth (65%, n = 26) or feeding directly from the breast (62.5%, n = 25).
Conclusions: Although BMF is used more proactively in UK neonatal units than previously, variation in practice remains. Individualised fortification is very uncommon and caution remains regarding risk of NEC. The development of national guidelines on the use of BMF would help to standardise nutritional care in neonatal units.

Introduction

Infants born prematurely, defined as before 37 weeks of gestation, are at increased nutritional risk. They are born before the large accretion of nutrient stores occurs via placental transfer in the third trimester of pregnancy [(1)]. They have less lean tissue than term infants [(2)]; hence, the principal aim of nutrition support in premature infants is to simulate *in utero* growth [(3,4)]. Inadequate nutrition can result in compromised postnatal growth, particularly poorer neurodevelopmental outcomes [(5)]. By contrast, it has been shown that postnatal growth failure in preterm infants is not inevitable, when there is an emphasis on improved nutritional care [(6)].

Providing optimal nutrition for preterm infants remains a challenge with many unanswered questions, particularly with regard to estimation of nutritional requirements. Maternal breast milk is the preferred feed, followed by donor expressed breast milk, provided from women who deliver at term [(1,4,7)]. Breast milk has numerous benefits compared to preterm formula, namely it contains immunoprotective factors, is protective against

sepsis and necrotising enterocolitis, and has better nutrient bioavailability [8,9]. Breast milk adapts for prematurity, containing higher levels of protein, energy and micronutrients than mature breast milk from mothers who deliver at term [7]. However, the nutrient levels in both preterm and mature breast milk do not always meet the elevated nutritional requirements of preterm infants, particularly for those born with a birth weight <1500 g [1,3,4]. Therefore, in developed countries, a multi-nutrient breast milk fortifier (BMF) is often added to breast milk to provide additional energy, protein, vitamins and minerals [1].

The use of BMF in preterm infants has been found to have beneficial effects on bone mineralisation, weight gain, and linear and head circumference growth [4]; however, international guidance on its use has subtle differences [4,10-12], not least because preterm infants are a heterogeneous group, born into different environments, on a continuum of gestation, development and nutritional status. In 2019, the European Milk Bank Association published guidelines recommending for preterm infants that nutrient fortification of human milk is required to optimise growth; however, further research is required to advance the type and method of fortification [1]. In the UK, BMF is used as part of standard feeding practices in most neonatal units [7]. It is administered as a powder, mostly as a fixed dose sachet and available for inpatient use only [13]. Some specialist hospitals are equipped with human milk analysers, which can measure the exact nutritional composition of the breast milk given to infants. Individualised fortification, either 'targeted' to breast milk composition or 'adjusted' according to an infant's biochemistry, can then be used to supplement with a precise quantity of nutrients required to meet the infant's requirements [1,14]; however, this level of precision is not available in the majority of UK neonatal units [14].

There are currently no national guidelines on when to initiate or discontinue BMF, or what dose should be given per day, potentially leading to inconsistent practices across different neonatal units. A recent UK survey of neonatology healthcare professionals illustrated a number of widely held beliefs regarding the use of BMF, some of which are not supported by current evidence [15]. Similarly, an international survey of neonatologists also demonstrated marked variability in neonatal feeding practices, including the use of BMF [16]. However, neither of these two studies focused on practices by neonatal dietitians, who play an essential role in assessing and enhancing the nutritional status of preterm infants as part of an effective multidisciplinary neonatal team [17,18]. The present study therefore aimed to explore the use of BMF in the UK by neonatal dietitians, with a specific focus on initiation, monitoring, contraindications and discontinuation.

Materials and methods

Participants and recruitment

Participants were recruited from the British Dietetic Association (BDA) neonatal specialist subgroup (n = 100). All members of the BDA neonatal specialist subgroup were eligible to participate provided that they worked with neonatal patients in the UK at the time of completing the survey. The survey was distributed to the groups' mailing list in May 2019 and remained open for 4 weeks, with a reminder sent at the start of the third week. It was also promoted via the official BDA paediatric group social media accounts.

Survey design and piloting

A survey was constructed specifically for this study, based on the study's objectives and a comprehensive review of the literature and similar studies [16,19]. The survey was piloted in April 2019 by six healthcare professionals with neonatal experience. Feedback from respondents was positive, reporting that the survey was simple, having a logical flow of questions and appropriate language.

The final survey consisted of 18 questions and was administered via an online platform 'Online Surveys' (https://www.onlinesurveys.ac.uk). It included preliminary questions on workplace, clinical caseload and years of work experience. Dichotomous questions determined whether BMF was used as part of routine clinical practice and the availability of local BMF guidelines. Multiple-choice questions were then grouped into themes to mirror the study objectives, containing hypothetical examples on initiation of feeds, rate of increase in feeds and cessation of BMF. It also enquired about the use of micronutrient supplements. Further details are provided in the Supporting information (File S1).

Statistical analysis

Data were exported to SPSS, version 24.0 [20]. Quantitative data were analysed using frequencies to describe trends in practice. Differences in practice between the three levels of neonatal units were explored using Fisher's exact test. $P < 0.05$ was considered statistically significant. Responses to an open ended question were assessed and categorised into themes.

Ethical approval was granted by the Faculty of Health and Human Sciences Ethics Committee at University of Plymouth prior to the recruitment of participants (reference number: 18/19-494, 18/19-514).

Results

Response rate and occupational characteristics

In total, 40 neonatal dietitians completed the survey, indicating a 40% response rate from potential participants. Two participants did not complete the free text question, listing clinical scenarios when breast milk fortifier would be contraindicated. The remainder of respondents answered all questions.

Neonatal units in the UK are categorised into three levels to distinguish the level of specialist care they provide: level 3 Neonatal Intensive Care Units (NICU) look after the most premature and unwell infants; level 2 (Local Neonatal Unit) units include high dependency beds; and level 1 units also known as Special Care Baby Units (SCBU) look after the most stable premature infants. In our sample, over half of respondents worked on level 3 NICUs, some of which had surgical units (65%, $n = 26$). A quarter worked in level 2 neonatal units (25%, $n = 10$), 5% ($n = 2$) worked in level 1 SCBUs and a further 5% ($n = 2$) selected the other response option. The free text responses included a neonatal unit incorporating all levels of care and one participant was a neonatal network dietitian. Over half of respondents (55%, $n = 22$) had greater than 5 years of experience with this patient group. Some 42.5% of respondents ($n = 17$) worked solely with neonatal patients, with 90–100% of their workload dedicated to this patient group.

Use of breast milk fortifier

All of the respondents ($n = 40$) used BMF. Local BMF guidelines were available to 77.5% ($n = 31$) of respondents and one participant used a neonatal network BMF guideline. From a multiple response question, neonatologists or consultant paediatricians were most likely (95%, $n = 38$) to commence BMF, followed by dietitians (87.5%, $n = 35$) and registrars or speciality trainee doctors (45%, $n = 18$).

Criteria for commencing breast milk fortifier

The following data describe responses from the multiple-choice questions where participants could select more than one answer. The free text answers to the 'other' response options were assessed and, if it was felt they represented one of the predetermined survey answers, then they were coded to this. Answers that did not fit the predefined response options were analysed separately and only disregarded if they did not answer the survey question.

A gestational age <34 weeks was most commonly used age criteria for commencing BMF (67.5%, $n = 27$), followed by a gestational age of <32 weeks (27.5%, $n = 11$). There was no difference between level 2 and 3 neonatal units in the gestational age when BMF was commenced ($P = 0.176$).

The use of birth weight as a criterion to commence BMF is shown in Fig. 1. It was commenced most frequently in infants with a birth weight <1500 g ($n = 24$, 60%), followed by a third (32.5%, $n = 13$) of dietitians using BMF with infants with extremely low birth weight (birth weight <1000 g). Four participants (10%) selected the other option, two of which specified a birth weight <2 kg as their criteria for commencing BMF. However, 32.5% ($n = 13$) did not use birth weight as a criterion for starting BMF.

Almost three-quarters (72.5%, $n = 29$) of dietitians started BMF when a feed volume of 150 mL kg^{-1} day^{-1} had been established, with only 12.5% ($n = 5$) starting at a volume of 120 mL kg^{-1} day^{-1}. Five respondents (12.5%) commenced BMF if at least 50% of the total daily enteral feed volume was expressed breast milk. No significant difference ($P = 0.460$) was found between level 2 and level 3 neonatal units and the volume of feed when BMF was commenced.

Most (60%, $n = 24$) of respondents did not use age as a criterion for commencing BMF, although 25% ($n = 10$) did wait until the infant was at least 14 days old. BMF was introduced by 57.5% ($n = 23$) of dietitians when an infant's weight gain fell below 15 g kg^{-1} day^{-1} and by 27.5% ($n = 11$) when an infant's growth had faltered. However, growth was not used in the assessment for starting BMF by 32.5% ($n = 13$) of dietitians. Forty-five percent ($n = 18$) of dietitians did not use serum biochemistry levels to determine whether BMF was commenced, whereas 30% ($n = 12$) and 20% ($n = 8$) of dietitians, respectively, commenced BMF when urea levels fell below 2 mmol L^{-1} or 4 mmol L^{-1}.

Starting dose of breast milk fortifier

Almost all respondents (87.5%, $n = 35$) used standard fortification methods, with only 5% ($n = 2$) and 7.5% ($n = 3$) of dietitians using targeted or adjusted fortification, respectively (i.e. based on analysis of maternal breast milk and monitoring biochemistry). Two dietitians commented that they aspired to using targeted or adjusted fortification but did not have sufficient time or equipment to facilitate these methods. In our sample, BMF was most commonly started by dietitians using a graded introduction approach. Some 40% of respondents ($n = 16$) recommended that BMF was introduced at half strength for 24 h, where 'half strength' equates to 50% of the dose of BMF recommended by manufacturers dissolved in 100 mL of expressed breast milk (EBM). 22.5%

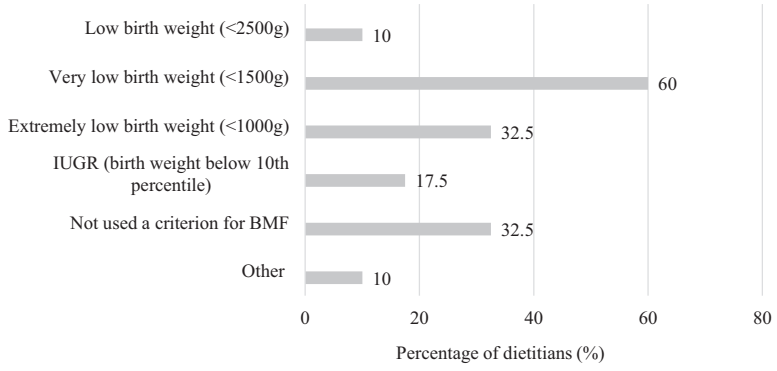

Figure 1 Birth weight used as a criterion for starting breast milk fortifier (BMF). IUGR, *In utero* growth restriction.

(n = 9) of respondents extended the 'half strength' graded introduction to 48 h.

Monitoring of biochemistry and micronutrient supplementation

Serum biochemistry was monitored routinely by 85% (n = 34) of dietitians when preterm infants received BMF in hospital. No neonatal teams conducted routine bloods on infants on BMF once discharged from hospital.

The multiple-choice responses on the use of micronutrients indicated that multivitamins (72.5%, n = 29) and iron (75%, n = 30) were given most commonly alongside BMF. This was followed by phosphate (32.5%, n = 13), folic acid (20%, n = *8*) and vitamin D (12.5%, n = 5). Three dietitians (7.5%) only gave additional micronutrient supplementation if indicated by the infants' biochemistry results or clinically indicated. Two dietitians (5%) did not recommend any additional vitamin or mineral supplements to preterm infants on BMF.

Contraindications for the use of breast milk fortifier

The free text responses (n = 38) to when BMF was contraindicated were grouped into eleven different themes (Table 1). Participants could list more than one contraindication. Necrotising enterocolitis (NEC), either confirmed or suspected, was cited as the most common reason for not using BMF (n = 24), followed poor tolerance or suspected cows' milk protein allergy (n = 12).

Discontinuation of breast milk fortifier

BMF was stopped by 50% (n = 20) of dietitians on discharge from the neonatal unit, with 7.5% (n = 3) using it 'rarely' on discharge. Only one dietitian (2.5%) routinely continued BMF on discharge, with two (5%) using a reduced dose. 35% (n = 14) of dietitians would recommend continuing BMF if the infant required it clinically.

Table 1 Clinical scenarios when breast milk fortifier (BMF) would be withheld or contraindicated (n = 38)

Free text answer	Number of respondents*
NEC/suspected NEC/distended abdomen	24
Poor tolerance/suspected cows' milk protein allergy	12
Infants which had gastrointestinal surgery/high stoma outputs post-surgery	7
Parental request	4
Medical treatment (chemotherapy/steroids/blood transfusion)	3
Absent/reversed end diastolic flow (abnormal placental blood flow)	2
Complex congenital cardiac defects	1
Weight less than 1000 g and on >50% parenteral nutrition	1
Less than 32 weeks of gestation	1
Close to discharge and BMF unavailable in the community	1
Term infant or weight greater than 2.5 kg	1

NEC, necrotising enterocolitis.
*Respondents could list more than one reason for withholding BMF.

The main indicators for discontinuing BMF (Fig. 2) were on discharge home (67.5%, n = 37), closely followed by satisfactory growth as indicated by tracking growth centile lines (65%, n = 26) or feeding directly from the breast (62.5%, n = 25).

Discussion

The present study explored the use of BMF by neonatal dietitians in the UK, with a specific focus on the criteria used to initiate and discontinue BMF, biochemical monitoring and contraindications. The results show that all respondents used BMF routinely in preterm infants, which is higher than previously reported in 2012, when only 69% of UK and Irish neonatal units used BMF as

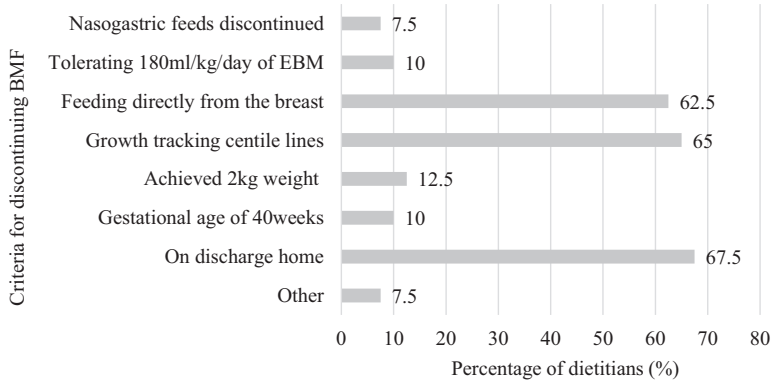

Figure 2 Criteria for discontinuing breast milk fortifier (BMF). EBM, expressed breast milk.

part of standard practice [16]. There was no disparity in the use of BMF between levels of neonatal unit, in contrast to a previous finding that BMF was used more commonly in level 2 versus level 3 neonatal units [15]. Most neonatal units (77.5%) had guidelines on the use of BMF, which is greater than the 49% previously identified [15]. Overall, the present study has demonstrated a positive change in dietetic practice. BMF is commenced proactively to optimise an infant's nutritional status in all levels of neonatal care, rather than postponing usage until there is a decline in nutritional status. However, some inconsistencies and limitations in practice remain, with a cautious approach in relation to the risk of NEC and scarce use of targeted fortification.

The study surveyed the practices of neonatal dietitians in the UK. All respondents were members of the neonatal specialist subgroup of the BDA, a specialist subgroup of the national professional body. Typically dietitians working in neonatal units work as part of a multidisciplinary team including physicians, nurses, pharmacists and other allied health professionals, an approach which has been shown to be effective [18]. The exact responsibility for who makes decisions about nutritional input will vary across different hospitals; generally they are dietetic-led, although made in conjunction with the multidisciplinary team. For example, in the present study, consultant neonatologists/paediatricians (95%), followed closely by dietitians (87.5%), were most likely to recommend starting BMF, although we did not explore the decision-making process any further. The evolving nature of neonatal dietetics has led to debate and discussion within the specialty about best practice and the need for a competence framework [21]. The situation is complicated by the inequality of dietetic service between regions, at different levels of neonatal unit. As such, the BDA neonatal specialist group has published a competency framework that outlines the specific skills and training needed by dietitians working on all levels of neonatal care unit [21]. Aligned to this, nationally endorsed staffing recommendations for all levels of neonatal unit have been developed to ensure that babies and their families receive the best level of care wherever they are treated [22].

There remains a variation in practice for the initiation of BMF; however, the most commonly cited criterion was volume of enteral feeds tolerated, which was closely followed by gestational age at birth, birth weight and rate of growth. Specifically tolerating 150 mL kg^{-1} day^{-1} of enteral feeds, being born before 34 weeks of gestation, having a birth weight <1500 g and gaining <15 g kg^{-1} day^{-1} were the most common indicators for starting BMF. Actual age and biochemistry were the least commonly used criteria in the present study. This change in practice from a previous international study [16] to include the volume of enteral feeds as one of the main criteria for starting BMF could be attributed to wanting to minimise the risk of NEC, by delaying the introduction of BMF until the infant has reached what is considered as a 'safe' enteral feed volume. The reported disparities in practice are reflective of differences between international guidelines. For example, the practice of commencing BMF in infants weighing <1500 g at birth aligns with guidance from the American Academy of Pediatrics [10], whereas the European Society of Paediatric Gastroenterology, Hepatology and Nutrition (ESPGHAN) recommend a birthweight < 1800 g as a criterion [8]. A minority of respondents (27.5%, $n = 11$) reported using faltering growth as a criterion for commencing BMF, as is recommended by the World Health Organization [10] in 2011, which is no longer considered best practice. However, the majority of dietitians started BMF as soon as the preterm infant started showing signs of suboptimal weight gain (<15 g kg^{-1} day^{-1}). As a consequence of the way that the survey questions were posed, it was not possible to explore every permutation for commencing BMF in more detail.

The majority of respondents (85%, $n = 34$) routinely monitored serum biochemistry when preterm infants were receiving BMF in hospital. Almost all dietitians used standard fortification methods, with only 12.5% ($n = 5$) using targeted and adjusted fortification of breast milk, possibly because most neonatal units do not have access to breast milk analysers [15]. Standard fortification remains the most widely used fortification method; however, this does not address the issue of protein undernutrition in very low birthweight infants [1]. It is recommended that fortification should start with standard fortification; however, if infants do not grow appropriately, individualised fortification is advisable (either adjustable or targeted), depending on the neonatal unit's experience and facilities [4]. Targeted fortification means that all macronutrients can be supplemented, potentially resulting in a more balanced composition and consistent intake of fat, proteins, and carbohydrates [14]. Although it has been shown to be feasible [14], targeted fortification requires a milk analyser, which requires careful calibration [1] and also requires real-time measurements, estimated to take an additional workload of approximately 5-10 min per milk batch once practitioners have been trained [14]. As it stands, a recent survey indicated that targeted fortification was only available on 36% of UK neonatal units [15], suggesting that there is significant room for improvement; however, this would be dependent on further resources and training being made available on an institutional level. Of note, a recent National Health Service strategy document about improving neonatal care advises that 'all staff are given formal learning opportunities to ensure that staff are adequately trained to undertake their role responsibilities' [23].

Respondents reported that multivitamins (72.5%), iron (75%), phosphate (32.5%), folic acid (20%) and vitamin D (12.5%) were given routinely alongside BMF. However, the questions did not distinguish whether supplementation differed depending on the strength of BMF being administered. The low rates of vitamin D supplementation in our sample are somewhat surprising, despite both brands of BMF not meeting the very high preterm vitamin D requirements (20–25 μg day^{-1}) set by ESPGHAN [1]. This could be the result of a reliance on historic vitamin D supplementation recommendations of 10 μg day^{-1} per day from 2005 [24].

NEC and suspected NEC were listed as the most common contraindications to using BMF. NEC is a severe inflammatory gastrointestinal condition, requiring surgery in 20–40% of cases, and is fatal in 25–50% of cases [25]. There are multiple factors that may contribute to NEC, with different types of nutrition affecting its onset and progression [25]. Although BMF derived from human breast milk is available in some countries [4], the available BMF in the UK is derived from bovine sources. The use of human fortified breast milk has been shown to reduce the risk of NEC compared with bovine-based fortified breast milk in a study of extremely premature infants [26]; however, it is not clear why some infants fed exclusively breast milk still develop NEC [25]. Our finding implies that dietetic practice remains cautious. This is despite evidence of no increased risk of NEC with the introduction of BMF at the infant's first feed or when fed 20 mL kg^{-1} day^{-1} of EBM, compared to delaying fortification until the infant was established on larger volumes of EBM [27,28]. The cautious approach of delaying fortification until feed volumes reach 100 mL kg^{-1} day^{-1} has been heavily criticised as lacking in evidence, being futile and ultimately delaying delivery of full nutrient requirements [29]. Similar to our findings, another UK-based study of predominantly neonatal nurses reported that 43% agreed 'BMF can be implicated in the pathogenesis of NEC' [11]. However, 84% agreed that 'BMF is safe for the majority of preterm infants' and 72% agreed that it 'is well tolerated by preterm infants' [15]. These findings emphasise the need to improve knowledge and ensure practice is based on current evidence.

Poor tolerance or suspected cow's milk protein allergy was the second most common free text response ($n = 12$) for withholding BMF. In preterm infants, cows' milk protein allergy often presents as non-specific gastrointestinal symptoms, making it difficult to distinguish from poor feed tolerance, which is common as a result of gut immaturity [30]. Of note, both BMFs used in the UK are bovine-based, although the degree of protein hydrolysis differs. Fortifiers based on human breastmilk are available in other countries. Optimising human milk-based fortifiers, bioengineered to contain as many bioactive products as possible [4], in addition to further research on development of NEC, may mitigate some of the concerns surrounding feed-related issues and causation of NEC.

In the present study, the most commonly cited reason for discontinuation of BMF was when an infant was discharged home (67.5%, $n = 27$), rather than based on a reaching a target weight. Although ESPGHAN recommends that preterm infants with a suboptimal weight should continue to have BMF following discharge home from hospital [31], more recent guidelines from 2019 conclude there is no consensus on post-discharge nutrition [1]. From a practical perspective, in the UK, BMF is not available on prescription in the community, although 35% ($n = 14$) of our respondents would continue BMF at home if clinically indicated. The inaccessibility of BMF for infants once discharged home means optimal dietetic care planning to support some infants who may need continued nutritional support is not always feasible.

The next most commonly cited reasons for cessation of BMF were when the infants' weight was tracking a centile line (65%, $n = 26$) or when infants were feeding directly from the breast (62.5%, $n = 25$). Although these findings are consistent with results from a previous survey in the UK and Ireland [14], it is surprising that feeding directly from the breast is one of the most common criteria for ceasing the use of BMF. BMF can be administered in a concentrated format orally prior to a breast feed, commonly known as a BMF 'shot', although some feel that this interferes with breast feeding and may prevent mothers from continuing to breastfeed exclusively [15]. A Cochrane review from 2013 identified only two small trials [32,33] comparing feeding preterm infants with BMF fortified breast milk to unfortified breast milk following hospital discharge, with no long-term data past 18 months of age [34]. Neither trial found a statistically significant difference in the overall duration of breastmilk feeding; however, one of the studies reported that statistically significantly fewer infants in the BMF group remained exclusively breastfed (no formula) at 4 months [33]. Subsequently, a UK-based quality improvement study has demonstrated that the growth trajectory of exclusively breastfed preterm infants discharged home on BMF was improved up to 1 year of age, with parents and healthcare professionals finding the use of home BMF supplement to be acceptable, feasible and safe [13]. Overall, there is an absence of evidence on the effect of using BMF post-discharge on long-term growth and developmental outcomes beyond 1 year corrected age and it is recommended that any future interventions are developed in conjunction with families and consider the potential for interference on breastfeeding [34].

Strengths and limitations

As a result of the absence of a national database for dietitians, it was a challenge to identify all paediatric dietitians working with preterm infants; hence, purposive recruitment was conducted via the BDA neonatal specialist subgroup. Membership of this group is voluntary; therefore, it was not possible to reach all practitioners. Our response rate of 40% was reasonable, although a higher rate would have made the results more externally generalisable. A longer response window or different method of distributing the survey may have elicited a higher response rate. A previous survey of the same specialist group had a higher response rate (66%) but a lower number of respondents ($n = 27$) [13]. Previous studies on the use of BMF in other healthcare professionals have elicited a wide variation in response rates, from an exceptional online response rate of 98% [14] compared to 26% in a postal survey [15]. A strength of the study is the specific focus on dietetic practice. Future research using a mixed-methods design or qualitative approach would enable further details to be explored, given that preterm infants are a heterogeneous group and investigating every permutation is not possible with a questionnaire-based study. It would also be useful to assess whether the dietetic time allocated to a neonatal unit or per neonatal cot influenced the use of BMF and growth outcomes.

Conclusions

In summary, BMF was used routinely by all respondents, across all three levels of neonatal unit, and was commenced proactively before an infants' nutritional status had been compromised. However worryingly, some nutritional practices are outdated and overly cautious, meaning that infants may be discharged with suboptimal nutritional input. The criteria used to commence BMF varied, although it was most commonly commenced in infants tolerating 150 mL kg^{-1} day^{-1} of enteral feeds, born before 34 weeks of gestation, in those with a birth weight <1500 g and gaining <15 g kg^{-1} day^{-1}. NEC or suspected NEC was the most commonly cited contraindication to introducing BMF. Targeted and adjusted fortification was only available to 12.5% of respondents. BMF was most often discontinued when an infant was discharged home or feeding at the breast. BMF guidelines are not available in all neonatal units across the UK, which may explain the differing practices. The development of national guidelines on the use of BMF, alongside investment in development of dietetic services and more widespread use of breast milk analysers, would help to standardise and improve nutritional management in neonatal units.

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Conflict of interests, source of funding and authorship

The authors declare that they have no conflicts of interest.
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SJ designed the study. SJ collected and analysed data, with supervision from KM. KM and SJ drafted the manuscript. All authors critically reviewed the manuscript and approved the final version submitted for publication.

Transparency declaration

The lead author affirms that this manuscript is an honest, accurate and transparent account of the study being reported. The lead author affirms that no important aspects of the study have been omitted and that any discrepancies from the study as planned.

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Supporting information

Additional supporting information may be found online in the Supporting Information section at the end of the article.

File S1. Survey questions.