A survey of neonatal nutrition policies and practices in the UK and Eire

David P. Tuthill on behalf of Child Nutrition Panel[1]
Department of Child Health, Children's Hospital for Wales, Heath Park, Cardiff, Wales, UK

Abstract

Optimal nutrition is one of the fundamental components for infants to reach their full growth and neurodevelopmental potential. Best practice is facilitated by a contemporaneous, multidisciplinary, evidence-based nutrition policy. Such evidence has recently been reviewed. We have assessed: the prevalence of nutrition policies in neonatal units in the UK and Eire; their application to hypothetical cases; the availability of dietetic input; and whether any differences existed between non-regional and regional units. A standardized questionnaire was devised by a multidisciplinary group and posted to all 255 neonatal units in the UK and Eire in 2002. Replies from 67 neonatal units were received: 48 out of 233 non-regional and 19 out of 22 regional units. A feeding policy was present in 33 units, and regular access to dietitians occurred in 37 units. For a hypothetical infant less than 28 weeks' gestation, enteral feeds would be commenced at 0–2 days in 81% of non-regional and 94% of regional units (P = ns), and be continuous in 11% of non-regional and 32% of regional units, and bolus feeding in 89% of non-regional and 68% of regional units (P = ns). Routine fortification of breastmilk would occur more frequently in non-regional units (96%) than in regional units (79%) (P = 0.050). Vitamin and iron supplements would be given to infants receiving postdischarge or high-energy milks in 68% of non-regional units and in 79% of regional units (P = ns). Calorie counts (63% regional vs. 8% non-regional, $P < 0.001$), and daily weights (68% regional vs. 33% non-regional, P = 0.014), were used more frequently in regional units. Many units surveyed did not have a nutrition policy. Many infants receive unnecessary additional vitamins and supplements. Practice is variable throughout the country, but we found no evidence of major differences between regional and non-regional units, apart from their monitoring of growth and rates of breastmilk fortifier usage.

Keywords: Neonate, breastfeeding, formula, nutrition, infant feeding.

Correspondence: David P. Tuthill, Department of Child Health, Children's Hospital for Wales, Heath Park, Cardiff, Wales CF14 4XN, UK. E-mail: david.tuthill@cardiffandvale.wales. nhs.uk

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Introduction

Good nutrition is essential for optimal development and health. Malnutrition in the neonatal and infant period leads to both acute and chronic problems. Acutely these include hypoglycaemia, hypocalcaemia, hyponatraemia and faltering growth. For preterm infants, post-natal growth retardation is a universal problem (Cooke *et al*. 2004). More chronic deficits lead to impaired neurodevelopmental outcome in premature babies (Lucas *et al*. 1994) and osteopaenia. It may also programme them for cardiovascular disease, hyperlipidaemia and non-insulin-dependent diabetes (Barker & Osmond 1986; Barker 1992). Nutrition therefore pervades all specialities, but its importance in the preterm and term infant undergoing the most rapid period of growth and susceptibility to nutritional programming is evident. Nutrition practice has often been based on historical belief and parental pressure. The strive for best practice in infant feeding continues, facilitated by further research into the benefits of breastmilk and the redesigning of infant formulae to avoid past problems such as hypernatraemic dehydration or hypocalcaemic fits. The gold standard in infant nutrition remains human breastmilk, and its use probably improves neurodevelopmental outcome (Anderson *et al*. 1999; Jain *et al*. 2002) and reduces the risks of necrotizing enterocolitis (Lucas & Cole 1990).

Optimal infant nutrition practice can be facilitated by an evidence-based nutrition policy and the involvement of a multidisciplinary team including neonatologists/paediatricians, dietitians, nutrition nurse specialists, microbiologists, biochemists and pharmacists. The evidence base has recently been extensively reviewed (Tsang *et al*. 2005). With the ever-increasing range of infant formulae and supplements, dietetic advice is increasingly beneficial. Such a team can ensure that the use of parenteral nutrition (PN) is optimally guided with a subsequent reduction in line infections and complications. Nutrition teams have also been shown to reduce the amount of PN used, increase enteral feeding (Abad-Sinden *et al*. 1998), and reduce hospital stay (Tucker & Miguel 1996) and catheter-associated sepsis in adults; similar reductions would be beneficial especially for neonates. Despite a wide range of evidence and publications on neonatal nutrition, practice is perceived to be variable.

In the UK, regional units tend to be those linked to traditional academic institutions offering the full range of neonatal intensive care and surgery. Non-regional units may or may not perform intensive care, and generally do not perform surgical interventions. There may well be differences in neonatal nutritional policies and thus probably practices, between the two types of unit.

Aims

The aims of this study were to assess: the prevalence and content of neonatal nutrition policies in neonatal units in the UK and Eire; their application to hypothetical cases; the availability of dietetic input; and whether any differences existed between non-regional and regional units.

Materials and methods

A standardized questionnaire (Table 1) was devised by a multidisciplinary group, including paediatricians, one with neonatal expertise (author himself), dietitians and a pharmacist. It focused on important issues concerned with feeding premature infants, and contained hypothetical examples on initiation of feeds, rate of increase in feeds and final daily volumes. It also sought the use of breastmilk fortifier and supplements such as vitamins and iron. This was posted to all neonatal units listed in the UK and Eire in the Special Care Baby Unit directory in summer 2002. The results were recorded by regional vs. non-regional units. Those units who did not reply within 4 weeks had a repeat mailing to the lead clinician. A book token to the value of £10 (15 Euros) was sent to all those units replying.

Statistical analysis

All questions were of a categorical format. Questions 4, 9, 10 and 26 were ordinal categorical (i.e. ordered) and hence analysed using the exact Wilcoxon test. The other questions were not ordinal and hence analysed

Table 1. Questionnaire template and answers

	Question	Answers	Non-regional ($n = 48$)	Regional ($n = 19$)	*P*-value
1.	Median (range) number of cots		15 (8–32)	23 (18–40)	
2.	Median (range) of admissions per year		250 (250–500)	480 (220–850)	
3.	Do you have a written policy on feeding preterm infants?	Yes	26 (54%)	7 (37%)	0.564
		No	21 (44%)	9 (47%)	
4.	Does the unit have input from a dietitian on a regular basis?	Yes	25 (52%)	12 (63%)	0.760
		No	12 (25%)	5 (26%)	
5.	How do you usually feed a preterm infant <28 weeks initially?	Nasogastric tube	31 (65%)	18 (95%)	0.100
		Orogastric tube	13 (27%)	8 (42%)	
		Transpyloric	1 (2%)	0 (0%)	
6.	When do you usually start feeding on infants <28 weeks' gestation?	0–2 days	17 (35%)	12 (63%)	0.176
		3–4 days	16 (33%)	4 (21%)	
		4–6 days	2 (4%)	1 (5%)	
7.	Is enteral feeding on your preterm infants bolus or continuous?	Bolus	41 (85%)	13 (68%)	0.067
		Continuous	6 (13%)	6 (31%)	
8.	What milk initially does your unit usually feed preterm infants?	Mothers' own EBM	41 (85%)	17 (89%)	0.105
		Banked EBM	6 (13%)	4 (21%)	
		Preterm formula	13 (27%)	1 (5%)	
		Term infant formula	0 (0%)	1 (5%)	
		Hydrosylate	1 (2%)	0 (0%)	
9.	How quickly do you increase the volume of feeds on average for an infant <28 weeks' gestation establishing feeding?	0–10 mL kg^{-1} day^{-1}	14 (29%)	5 (26%)	0.334
		11–20 mL kg^{-1} day^{-1}	9 (19%)	1 (5%)	
		21–30 mL kg^{-1} day^{-1}	14 (29%)	2 (11%)	
		>30 mL kg^{-1} day^{-1}	0 (0%)	2 (11%)	
10.	Once feeding is established, what are the final feed volumes given per day?	100–149 mL $kg^{-1}day^{-1}$	0 (0%)	0 (0%)	0.785
		150–170 mL kg^{-1} day^{-1}	19 (40%)	9 (47%)	
		≥171 mL kg^{-1} day^{-1}	23 (48%)	8 (42%)	
11.	If you change from a preterm formula to a normal infant formula, does this depend on the weight or gestation of the infant?	Weight	40 (83%)	13 (68%)	0.267
		Gestation	6 (13%)	2 (11%)	1.000
12.	Does your unit use a breastmilk fortifier?	Yes	46 (96%)	16 (84%)	0.050
		No	2 (4%)	4 (21%)	
13.	Which breastmilk fortifier do you commonly use?	SMA Breastmilk Fortifier	8 (17%)	2 (11%)	0.210
		Milupa Eoprotein	7 (15%)	5 (26%)	
		Cow & Gate Nutriprem	35 (73%)	7 (37%)	
14.	Why do you offer this particular milk fortifier?	Contract	14 (29%)	3 (16%)	0.743
		Composition	14 (29%)	5 (26%)	
		Tolerance	12 (25%)	2 (11%)	
		Other	8 (17%)	6 (32%)	
15.	Do you delay the introduction of breastmilk fortifier until 2 weeks after delivery date?	Yes	16 (33%)	1 (5%)	0.230
		No	24 (50%)	7 (37%)	
16.	Do you supplement all preterm infants routinely with vitamins, etc. if they are receiving breastmilk with no fortifier?	Yes	47 (98%)	19 (100%)	1.000
		No	1 (2%)	0 (0%)	
17.	Do you supplement all preterm infants routinely if they are receiving formula (either preterm, standard or hydrolysate)?	Yes	42 (88%)	17 (89%)	1.000
		No	6 (12%)	2 (11%)	
18.	Do you supplement preterm infants routinely if they are receiving nutrient-enriched postdischarge formula/or a high-energy formula?	Yes	29 (60%)	12 (63%)	1.000
		No	12 (25%)	6 (32%)	
19.	How do you monitor the preterm infant's growth/ weight status?	Daily weights	20 (42%)	13 (68%)	0.014
		Calorie counts (kcal kg^{-1} day^{-1})	6 (13%)	11 (58%)	<0.001
		Weekly lengths	21 (44%)	6 (32%)	1.000
		Weekly head circumferences	33 (69%)	15 (79%)	0.382
		Growth charts	37 (77%)	11 (58%)	0.075

Table 1. *Continued*

	Question	Answers	Non-regional ($n = 48$)	Regional ($n = 19$)	*P*-value
20.	Does your unit have access to a speech and language therapist?	Yes	42 (88%)	17 (89%)	1.000
		No	6 (12%)	2 (11%)	
21.	Do you have a written policy to encourage non-nutritive sucking, e.g. offering the breast, a bottle, dummy?	Yes	24 (50%)	8 (42%)	1.000
		No	21 (44%)	9 (47%)	
22.	What form of non-nutritive sucking do you encourage?	The breast	35 (73%)	14 (74%)	1.000
		A bottle	6 (13%)	0 (0%)	0.173
		A dummy	35 (73%)	13 (68%)	0.768
23.	Does your unit routinely use the following for feeding preterm infants when they are discharged from hospital?	Breastmilk	48 (100%)	19 (100%)	0.082
		Postdischarge formula e.g. Cow & Gate Nutriprem 2	21 (44%)	6 (32%)	0.176
		High-energy formula e.g. SMA High Energy, Nutricia Infatrini	14 (29%)	4 (21%)	0.551
		Term infant formula	38 (79%)	13 (68%)	0.169
24.	Do you find that reflux is a problem for preterm infants once discharged from SCBU?	Yes	27 (56%)	11 (58%)	1.000
		No	13 (27%)	6 (32%)	
25.	If yes, do you use any of the following to help manage the reflux?	Feed thickener additive, e.g. Carobel, Nestergel	21 (44%)	9 (47%)	1.000
		Thickened term formula, e.g. Enfamil AR	16 (33%)	4 (21%)	0.255
		Medication, e.g. Gaviscon	30 (63%)	13 (68%)	1.000
26.	When do you advise mothers to start weaning their preterm infants?	0–3 months	0 (0%)	0 (0%)	0.587
		4–6 months	41 (85%)	16 (84%)	
		7–9 months	2 (4%)	0 (0%)	
27.	What would you recommend mothers to wean their preterm infants onto initially?	Pure baby rice	43 (90%)	16 (84%)	0.678
		Vegetable purees	8 (17%)	3 (16%)	1.000
		Fruit purees	5 (10%)	2 (11%)	1.000

EBM, expressed breastmilk; SCBU, Special Care Baby Unit.

using the Fisher's exact test. All *P*-values are comparing the proportion of responses in the regional units with those in the non-regional units. A *P*-value of <0.05 was taken as significant.

Results

The mailing was sent to all 255 (22 regional and 233 non-regional) neonatal units throughout the country in 2002, with 67 units replying (regional: 19/22; non-regional: 48/233). Replies were received from all over the countries, with no obvious areas of non-response. Regional units had a median of 23 cots (range 18–40) with a median of 480 admissions per year (range 220–850). Non-regional units had a median of 15 cots (range 8–32) with a median of 250 admissions per year (range 250–500). The questions and results are summarized in Table 1. The average unit size for all units responding was 20 cots with around 390 admissions per year (regional: 25 cots, 516 admissions; non-regional: 16 cots, 264 admissions).

A feeding policy was said to have been present in 33 units, 30 units did not have one, and 4 were unsure (regional: 7 yes, 9 no, and 3 unknown; non-regional: 26 yes, 21 no, and 1 unknown). Input from a dietitian on a regular basis occurred in roughly three-quarters of all units, with no significant difference between regional and non-regional units.

The questionnaire focused on feeding practice in the given hypothetical examples. Most units stated that they would use a nasogastric, rather than an orogastric, tube to initially feed a preterm infant with an inadequate suck or swallow. A transpyloric tube was suggested by only one unit. Cup-and-spoon

method was suggested with increasing frequency once the gestation matured above 30 weeks in some units.

The proposed initial feeding of infants less than 28 weeks' gestation is not statistically significantly different between non-regional and regional units. Initial enteral feeds are generally boluses (13 regional vs. 41 non-regional units) rather than by continuous infusion (6 regional vs. 5 non-regional units), a difference verging on statistical significance ($P = 0.067$). All units expressed a preference for using the mother's own expressed breastmilk over formula.

Feed volumes were increased for infants less than 28 weeks' gestation by 10–30 mL kg^{-1} day^{-1} in all units. Their final volumes of milk intake once enteral feeding was established were 150–170 mL kg^{-1} day^{-1} in 11 regional and 20 non-regional units, and ≥171 mL kg^{-1} day^{-1} in 8 regional and 25 non-regional units. The change from a preterm formula to a standard infant formula depended far more often on weight than on gestational age.

Routine fortification of breastmilk would occur more frequently in non-regional units (96%) than in regional units (79%) ($P = 0.050$) but, in almost all units, was commenced earlier than the manufacturer's recommendations to start only after 2 weeks post delivery due to the higher protein levels in preterm breastmilk. This advice was followed in only one regional unit and 16 non-regional units. A variety of different fortifiers are used, Cow & Gate Nutriprem Breastmilk Fortifier® (Nutricia Ltd, Trowbridge, UK) being the most common. Interestingly, this was generally said to have been for contract reasons (14) rather than composition (14) or tolerance (12).

There was a wide variation in the use of supplements with a combination of iron, phosphate, vitamins and folic acid routinely given to preterm babies (Table 2). Only one unit did not supplement all preterm infants routinely if they were receiving breastmilk with no fortifier. Two of 19 regional units and seven of 48 non-regional units did not supplement infants if receiving infant formula (either preterm, standard or hydrolyzed). Supplements were not given to preterms routinely if they were receiving a post-discharge formula or a high-energy formula in six regional and 13 non-regional units.

Table 2. The variation in dose and duration of daily routine supplements used for preterm infants in regional and non-regional units

	Regional			Non-regional		
	Dose range per day	Start supplements	Stop supplements	Dose range per day	Start supplements	Stop supplements
Folic acid	0.1–1.0 mg	Full feeds or 10 days	Discharge to 1 year	0.1–1.0 mg	2 weeks or full enteral feeds	Weaning to 6 months
Phosphate	1 mmol kg^{-1}	If PO4 <1.8 mmol l^{-1} or day 10	Discharge or alkaline phosphatase <4–600 IU L^{-1}	1–3 mmol kg^{-1}	'low phosphate' +/– high Alkaline phosphatase	Alkaline phosphatase <500 IU L^{-1} to 1 month post term
Iron	3.3–13.75 mg	14–21 days	Weaning to 1 year	5.5–13.75 mg	2–8 weeks	6 months to 1 year
Multivitamins	0.3–0.6 mL Abidec®/Dalivit®	7–10 days	Weaning to 5 years	0.3–0.6 mL Abidec®/Dalivit®	2 weeks or full feeds	Weaning to 1 year

Nutritional adequacy should lead to optimal growth. This was monitored by a variety of techniques, including daily weights, calorie counts, and weekly length and head circumference measurements. Differences between the units were observed in how they monitored infant growth/weight status, with regional units having a significantly more frequent use of daily weights and calorie counts. Calorie counts were used in 63% of regional units compared with 8% of the non-regional units ($P < 0.001$), and daily weights were used in 68% of regional units compared with 33% of the non-regional units ($P = 0.014$). Most units had access to a speech and language therapist (17/19 regional vs. 42/48 non-regional). Around half of the units had a written policy to encourage non-nutritive sucking. This was generally on the breast or by an infant pacifier. The preferred style of non-nutritive sucking was often determined by a speech and language therapist or a standard feeding policy. At the time of the questionnaire, the postdischarge formula Nutriprem 2® (Nutricia Ltd, Trowbridge, UK) was not licensed in the UK. The two high-energy infant formulae available in the UK (SMA High Energy®, SMA Nutrition, Maidenhead, UK; Nutricia Infatrini®, Nutricia Ltd, Trowbridge, UK) were not designed for preterm infants, but, despite this, they were used in many units. Breastfeeding was obviously encouraged by all units. For those mothers unable or unwilling to breastfeed, a variety of different formulas were found to be prescribed or encouraged for their preterm infants upon discharge, both regionally and non-regionally. For those encouraging postdischarge formula, this was most commonly suggested to be used for 4–6 months after discharge. This was generally bought from a pharmacist, although some units were able to supply a month's formulae. For those mothers with financial difficulties who would normally receive free formula milk via milk tokens, they were generally given standard formulae or a high-energy formula. The high-energy formula use was also continued generally for around 4–6 months. Regional and non-regional units also had other reasons, including adequate growth rates for its cessation.

Gastro-oesophageal reflux was perceived to be a problem for preterm infants upon discharge in around two-thirds of units. This was generally managed with a feed thickener or a thickened term formula. Medication was used in around two-thirds of cases. Few units mentioned infant positioning on the left lateral side such which may be beneficial (Tobin *et al*. 1997).

Almost all units suggested weaning infants at 4–6 months after delivery (just two non-regional units suggested delaying to 7–9 months). Standard weaning foods were suggested, but predominantly pureed baby rice.

Discussion

A wide range of neonatal unit nutrition practice and advice was found in responding units. The non-response of so many non-regional units may imply a lack of interest, policy or specific staff for nutrition issues, or simply just apathy for a postal questionnaire. We acknowledge that the non-responding units may be different from those responding. Little difference, however, was noted in comparison between regional and non-regional units in those replying. Essentially, only the monitoring of growth and the use of breastmilk fortifiers was significantly different. We were surprised that several units had no dietetic input, despite this being valuable in maintaining knowledge of available formulae and their changing composition.

The use of a trans-pyloric tube in one unit was noted. This practice can be associated with a wide variety of problems, and so the vast majority of units only use nasogastric or orogastric tubes initially when enterally feeding preterm infants. Cup-and-spoon methods are perceived to be time consuming and do not appear to be widely used. The evidence for them improving breastfeeding rates in preterm infants is inconclusive.

Minimal enteral nutrition is of great value for reducing jaundice, infections and time to discharge (Dunn *et al*. 1988; McClure & Newell 1999; Tyson & Kennedy 2000), and should therefore be used for preterm infants. It does not appear to be associated with increased rates of necrotizing enterocolitis. There is debate over whether continuous or bolus feeding is better in this situation, as the evidence is inconclusive

(Cooke & Embleton 2000; Premji & Chessell 2001). The reasons for the regional trend to continuous feeds are unclear. In infants with respiratory compromise, continuous feeding may improve lung function (Greenspan *et al*. 1988). Most units, however, opt for bolus feeding initially.

Rates of increase of feed are thought to be important in reducing necrotizing enterocolitis. A recent Cochrane review showed that rates of increase of $\leq$30 mL kg^{-1} day^{-1} did not appear to result in increased rates of necrotizing enterocolitis (Kennedy & Tyson 2000). It would seem reasonable practice, therefore, to have rates increasing up to this rate if tolerated to reduce the use of intravenous feeding/fluids and their attendant complications. More importantly though, is the use of breastmilk, which has been shown to have a seven-fold lower rate of necrotizing enterocolitis (Lucas & Cole 1990).

Some units appear to be reluctant to feed babies more than 150 mL kg^{-1} day^{-1} (the standard requirement for a term infant). Most preterm formulas should also result in normal growth when fed to the infant at this volume, due to their higher protein and energy content. The delivery of breastmilk is highly variable due to the loss of fat adhering to the expressing equipment and enteral feeding tube. Even with supplementation, breastmilk may still need to be fed at higher volumes, perhaps up to 200 or 210 mL kg^{-1} day^{-1}. There have been concerns that breastmilk fortification may be associated with an increase in sepsis and possibly a trend towards increased rates of necrotizing enterocolitis (Lucas *et al*. 1996). However, the benefits of improved growth initially and earlier discharge, albeit that these growth improvements are not sustained at 18 months, lead most units to use them. As stated earlier, manufacturers' policies suggest that breastmilk fortifiers should not be used until 2 weeks after delivery due to the higher protein content of breastmilk at this stage. Neonatal units, however, rarely followed this advice. It is easier practice to change an infant from a preterm/fortified breastmilk feed to a normal infant formula/sole breastfeeding at a given weight rather than gestation and, indeed, this was the common practice.

Almost all units give supplements to preterm infants; a wide variety of initiation times and durations were noted. The most common supplements included folic acid, phosphate, iron and multivitamin preparations. There was a 10-fold range of folic acid dose from 0.1 to 1 mg day^{-1}, generally with initiation at full feeds continuing either to discharge or 1 year. Phosphate doses had a three-fold range from 1 to 3 mmol kg^{-1} day^{-1}, usually beginning as soon as enteral feeds were established in breastfeeding infants and continuing until either discharge or weaning. Iron medication was given over a 2.5-fold dose range from 5.5 to 13.75 mg day^{-1}, starting 2–8 weeks of age and continuing on to 6–12 months. Most units given 400–1000 IU of vitamin D daily, commencing with full enteral feeds and until either 28 days, weaning or discharge. Multivitamins were generally commenced either with full feeds or at 2 weeks of age until either weaning or 1 year of age. Only two units used vitamin E supplementation. These multivitamin supplements were given to infants if they were receiving breastmilk with no fortifier. Some units gave vitamin D in addition to a multivitamin. Those receiving preterm formula or term formula or nutrient-enriched discharge formula would be unlikely to require additional vitamins or iron. Thus, some rationalization of practice could be achieved. This is particularly true of those infants initially receiving preterm formula and then subsequently receiving nutrient-enriched discharge formulae for 6–9 months. Indeed, the routine of unwarranted early use of vitamins may increase food allergy rates (Milner *et al*. 2004).

Availability of speech and language therapists appeared reasonable, but it is of concern that six non-regional units stated they had no access to a speech and language therapist. The involvement of speech and language therapists in cases with feeding difficulties, such as oral hypersensitization, is useful, especially in those infants who have needed prolonged use of nasogastric tubes.

High-energy formulae were often used for preterm infants upon discharge when not being breastfed. These formulae were designed for term infants with growth faltering and are not appropriate for preterm infants, their protein energy ratio can be lower, and they do not have adequate calcium and phosphate content. At the time of the survey, there were widespread problems with obtaining these nutrient-

enriched discharged formulae for parents, especially those receiving supplementary benefits/milk tokens, who were unable to have these formulae provided. Due to their non-prescribability, few units used nutrient-enriched discharge formulas for preterm infants, but substituted high-energy term formulae. Since August 2002 Nutriprem 2® has become prescribable, and this may well change practice. Anecdotally, this position appears to have changed since the survey.

Gastro-oesophageal reflux was perceived as a common problem with a variety of different solutions used. This generally resolves with time, and the use of some positioning techniques may be beneficial before using drugs or medication. Feed thickeners are generally benign, but are not always effective. The antireflux term infant formulae may be effective for treating reflux, but are not always appropriate for a preterm infant, because of their lower protein energy ratio than a preterm formula and lack of polyunsaturated fatty acid supplementation.

Weaning is a subject open to a wide variety of opinions. Recent evidence has hinted at beneficial effects on growth and iron status from the use of more nutrient-dense weaning solids with higher protein energy ratio and given earlier than normal practice in preterm infants, but no units mentioned the use of these (Marriott *et al*. 2003). Delaying the introduction of solids until term equivalent plus 4–6 months may miss critical periods of feeding and delay feeding the extremely preterm infants for up to 8–9 months. Such practice is unusual in the UK.

Conclusions

Many units surveyed did not have a nutrition policy, and there appears to be widespread limited regular access to dietitians. Currently, it would appear that many infants receive additional vitamins and supplements that may be of little value for them. Practice is variable throughout the country, but we found no evidence of major differences between regional and non-regional units, apart from in their monitoring of growth and rates of breastmilk fortifier usage.

Practice points

- Always use breastmilk whenever possible;
- Breastmilk fortification will improve infant growth and bone mineral density in the short term;
- Minimum enteral feeding should be started early;
- Use of a postdischarge formula (Nutriprem/Premcare) will enhance growth in bottle-feeding infants;
- Use a postdischarge formula until 6-month postnatal age in those under 1.8 kg; and
- Routine vitamin and mineral supplements are unnecessary in most preterm infants on postdischarge formula.

Ethical considerations

This postal questionnaire was essentially an audit of practice and had no effect on the health care given to children, thus ethical approval was not sought.

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The questionnaire was sent out from SMA Nutrition and replies coordinated there. A book token to the value of £10 (€15) was sent to all those units replying. No other funding or payments were made to any individuals or units.

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