Use of Enteral Nutritional Supplementation: 
A Survey of Level II and III Neonatal Units in England

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ABSTRACT
Enteral nutritional supplementation is widely used in preterm babies on Neonatal Units (NNUs). There is little published evidence on appraising their long-term efficacy. We evaluated the current practice of enteral nutritional supplementation in 96 level II and III NNUs in England. 96%, 98%, 98% and 56% units use breast milk fortification (BMF), iron, multivitamins and folic acid supplementation respectively. Iron, multivitamins and folic acid supplements are routinely commenced in babies < 35 weeks gestation by 73%, 68% and 39% NNUs respectively. Seventy eight percent NNUs only use BMF for babies that are not gaining weight. Continuing variable practice of enteral nutritional supplementation and current use of anecdotal evidence and best guess recommendations highlights the need for a unified approach and collaborative multinational research to produce standardised guidelines.


Preterm infants have higher micronutrient requirements than the infant born at term. This is mainly due to low stores following premature delivery during the third trimester when stores are laid down. These infants might also have reduced gut absorption and immature enzyme transport systems during the first few weeks of life. Although, actual requirements for micronutrients are very small in comparison to macronutrients (such as protein, fat and carbohydrate), they are vital to a number of metabolic processes. The nutrient content of human milk provides insufficient quantities of protein, sodium, phosphate and calcium to meet the estimated needs of a preterm infant.

Enteral nutritional supplementation is widely used on neonatal units (NNUs) throughout the United Kingdom (UK). This is given in the form of breast milk fortification (BMF), multivitamin (MV) drops, folic acid (FA), and iron supplementation. The evidence base for exact requirements of vitamins for preterm and intrauterine growth retarded infants is limited. Moreover, there is little published evidence on evaluating their long-term efficacy in preterm babies and when they should be started and discontinued. There are no national guidelines on the use of supplementation, with many NNUs setting their own standards. This survey was conducted to evaluate the current practice of enteral nutritional supplementation in level II and III NNUs in England.

A total of 113 level II and III neonatal units in England were identified from the BLISS charity register in 2011. A standardised questionnaire was used to ask neonatal nurses, advanced neonatal nurse practitioners or doctors about the current practice of enteral nutritional supplementation on their unit. The survey was completed by 96/113 (85%) of the neonatal units (55/96 (57%) level II and 41/96 (43%) level III NNUs).

Ninety-two (96%) of neonatal units used BMF. Seventy eight percent NNUs only used breast milk fortification for babies that are not gaining weight. Fifteen percent of the units added BMF routinely on all babies when they are on full feeds. Seven percent NNUs do not have a defined BMF policy. Seventy percent respondents had no information on gestation or weight criteria for using BMF.

Ninety-four (98%) NNUs routinely used MV supplementation. In babies < 35 weeks gestation, MV supplementation is routinely commenced by 68% NNUs. Four percent NNUs administered MV supplementation to all of their admitted babies (irrespective of birth weight or gestation). Timing of commencement of MV supplementation was mostly dependent upon enteral feeds and postnatal age. Forty nine percent units commence MV when babies are on full feeds while 16% and 24% units commence MV at day 7 and 14 respectively. Practice was variable in 11% NNUs. MV supplementation is discontinued at a variety of end points i.e. when infant is fully weaned (24%), at the age of 6 (14%) or 12 months (41%). Three percent units recommend continuing MV supplementation till 5 years of age. Eighteen percent NNUs provided variable advice on discontinuation of MV.

Only 54 (56%) NNUs routinely used FA supplementation. In babies < 35 weeks gestation, FA supplementation...
was routinely commenced by 39% NNUs. Twenty five percent units commenced FA when babies are on full feeds while 7% and 15% units commenced FA at day 7 and 14 respectively. Ten percent units discontinue FA at discharge from NNUs while 19% recommended stopping FA supplementation when infant is fully weaned. Eight percent and 9% units advice continuing FA supplementation till 6 and 12 months of age respectively.

Ninety-four (98%) NNUs routinely used iron supplementation. Iron supplementation was routinely given to babies < 35 weeks gestation by 73% NNUs. Iron supplements are commenced at day 14, 21 and 28 in 7%, 11% and 69% units respectively. Iron supplementation is discontinued at a range of timings i.e. when infant is fully weaned (26%), at the age of 6 (42%) or 12 months (17%). Fifteen percent NNUs provided variable advice on discontinuation of iron supplementation.

There is little evidence on the best practise of using enteral supplements in preterm babies and therefore, our survey has shown a wide range of practices in level II and III neonatal units across England. Majority of neonatal units surveyed used BMF for any baby not gaining weight and routinely used MV and iron supplementation. There were wide differences when supplementations were commenced and the criteria for babies to receive these supplements.

Published evidence strongly recommends that all term infants should be exclusively breastfed for the first 6 months of life. In comparison to term infants, preterm babies have reduced nutrient stores and relatively rapid postnatal growth. Multi-nutrient fortifiers which supplement protein, calcium, sodium and phosphate may be added to EBM and have been shown to improve bone mineralisation as well as short term weight gain, linear growth and head growth. A Cochrane review in 2004 examined 13 randomized controlled trials evaluating the supplementation of human milk with multi-component fortification. The review concluded that BMF improves the short term weight gain, linear growth and head circumference compared to babies fed with breast milk alone. There was no increase in clinically significant adverse effects including necrotising enterocolitis and feed intolerance. In this survey, lack of universal use of BMF in preterm infants is likely to be due to dearth of positive long-term outcomes and anecdotal concerns about its safety.

Water soluble vitamins are co-factors for enzyme reactions in intermediary metabolism. The preterm infant is at risk of deficiency because of immaturity in incorporating and conserving vitamins and low tissue stores, rapid growth and high metabolic turnover. MV drops available in UK include Vitamin A, B group, Vitamin C and D. The recommendations when to commence multivitamins are uncertain although it is thought to be best to start when infants are on full enteral feeds. Almost, all the NNUs surveyed use MV supplementation in preterm infants. Advice on discontinuation of MV preparation was not consistent and varied from weaning to 6 – 12 months of age.

Vitamin D is important for calcium absorption, bone mineralisation, and neuromuscular function. In order to replenish low foetal plasma levels of Vitamin D, the European Society of Paediatric Gastroenterology Hepatology and Nutrition (ESPGHAN) recommends higher Vitamin D supply in preterm infants fed formula or breast milk (an intake of 800 – 1000 units per day) during the first months of life. Majority of NNUs in England used MV preparation (Vitamin A, Vitamin D, B group and Vitamin C). Inconsistency in its use and shorter duration of folate supplementation in this survey highlights lack of robust evidence of its short and long-term efficacy data.

Iron is essential for brain development. Iron deficiency anaemia is associated with poor neurodevelopmental outcome. In a randomised trial of early versus late enteral iron supplementation, early iron supplementation was safe in infants with birth weight < 1301 grams. It reduced the incidence of iron deficiency and the number of blood transfusions after 14 days of life. This survey suggests that majority of NNUs in England commence iron supplementation at 4 weeks of postnatal age and recommend continuing it till 6 months of age. ESPGHAN recommends an intake of 2 – 3 mg/kg per day to prevent iron deficiency especially in infants < 1800 g and to avoid side effects from overload. Prophylactic enteral iron started at 2 – 6 weeks of age (2 – 4 weeks in extremely low birth weight infants) is recommended for all preterm infants. Enteral iron doses of > 5 mg/kg may be a risk factor for retinopathy of prematurity and hence should be avoided. ESPGHAN recommends continuing iron supplementation after discharge until at least 6 – 12 months of age.

ESPGHAN review on current evidence on the nutrition needs of premature infants provides guidance on quantity and quality of nutrients needed for preterm infants in order to attain postnatal growth and functional development which is comparable to foetal growth. Their recommendations relate to enteral nutrition intake of stable preterm babies up to an approximate weight of 1.8 kg. Current use of anecdotal evidence and best guess recommendations highlights the need for a unified approach across the UK and collaborative multinational research to produce standardised guidelines.

REFERENCES

1. Greene H, Hambidge K, Schanler R, Tsang R. Guidelines for the use of vitamins, trace elements, calcium, magnesium, and phosphorus in infants and children receiving total parenteral...


