

Feeding the Preterm Infant



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Thanks to advances in antenatal care, the overall survival rates for preterm infants has increased in England over the last two decades.¹ As these infants are vulnerable, specialist paediatric dietitians play a crucial role in providing the appropriate nutritional support and intervention which is required to make sure that the diet of these infants is effectively managed.

A preterm infant is an infant born before 37 completed weeks' gestation. Missing some or all of the third trimester of pregnancy has a significant impact on an infant's growth and development. Therefore, these infants have higher nutritional requirements than term infants and need to be managed appropriately. Physiological and metabolic stresses, such as respiratory distress or infection, will also increase additional nutritional demands, all of which need to be carefully and appropriately managed.^{2,3}

Inadequate nutrition, particularly in preterm infants, can have short- and long-term health effects, including an association with longer stays in the neonatal unit, an increased risk of infection and worsened developmental outcomes.⁴ Before feeding is started, however, it is important that the infant is assessed by the multidisciplinary team.

Parenteral nutrition

For most preterm infants, especially if an infant is under 30 completed weeks gestational age or has a birthweight below 1 kg⁶ (**Table One**), nutrition support is likely to be provided by parenteral nutrition within the first few hours of life. Parenteral nutrition is often lifesaving for preterm infants who are unable to tolerate sufficient enteral feeds to meet their nutritional needs.

Table One: Definition of Low Birth Weights

Birthweight: The first weight of the new born obtained after birth (ideally within one hour of delivery)⁵

Low birthweight (LBW)	<2.5 kg
Very low birthweight (VLBW)	<1.5 kg
Extremely low birthweight (ELBW)	<1.0 kg

According to NICE,⁴ the current practice for using neonatal parenteral nutrition for preterm infants is in the immediate postnatal period whilst the preterm infant is attempting to establish enteral feeding but has not yet established a nutritionally adequate breast milk or preterm formula intake. This can last a few hours, days, weeks, or longer, depending on the prematurity of the infant and whether they have digestive problems. Neonatal parenteral nutrition may also be used for infants whose feeds are being withheld because necrotising enterocolitis (NEC) is present or suspected, for critically ill infants, or for infants with gastrointestinal disorders who require surgery.⁴

Necrotising Enterocolitis (NEC) is when tissues of the intestine become inflamed and start to die, which can lead to perforation. This can be very serious for infants, and affects more infants born prematurely than those born at term.

Breast milk

Breast milk offers many health benefits for premature infants, including providing antibodies to help mature the infants gut and immune system, along with reducing the risk of NEC.⁷ Therefore, when a preterm infant can tolerate milk, breast milk should be the recommended choice of feeding. If an infant is under 35 weeks gestational age, or too immature to suckle, a mother can express her breast milk and the infant can be fed via an orogastric or nasogastric tube which goes directly into the stomach from day two of life. Once the infant is mature enough to suckle, tube feeding may continue whilst the infant is learning to breastfeed, or bottle feed, to ensure sufficient nutrition.

According to the Great Ormond Street Hospital (GOSH) clinical guidelines:⁶

- Preterm infants who weigh more than 1.5 kg should receive 150 ml/kg to 220 ml/kg of expressed breast milk. Feed volume should be maximised before considering the addition of a breast milk fortifier. Infants receiving unfortified expressed breast milk should receive multivitamin drops, iron, folic acid, phosphate and sodium supplementation. Serum calcium should be monitored, and supplements should be provided if necessary
- Preterm infants who weigh less than 1.5 kg will not be able to meet their nutritional needs using expressed breast milk alone.⁷ For these infants, expressed breast milk should be fortified to increase the protein content, along with the addition of vitamins and minerals
- Breast milk should be fortified with a breast milk fortifier specifically designed for preterm infants. Infants should be tolerating 150 ml/kg for expressed breast milk for 48 hours before starting a breast milk fortifier
- If an infant is at term, weighs more than 2.5 kg, but is not meeting growth expectations, a standard infant formula powder may be used to fortify feeds

Preterm formula

Although a mother's milk supply is not affected by premature birth, having a preterm infant can increase stress and fear for the mother which can lead to difficulties in milk production. If a mother cannot breastfeed, or if a mother chooses not to breastfeed, a specialist ready-to-feed preterm formula should be used. These formulae have been specifically developed to meet the additional nutritional needs and metabolic requirements of preterm infants. Therefore, an infant who is receiving 150 ml/kg/day of preterm formula does not need the addition of vitamin and mineral supplementation.

All infants who are less than 2 kg in weight and under 35 weeks gestational age and not receiving breast milk should be receiving a preterm formula.⁸ This formula should be used until the infant

has reached a body weight of 2-2.5 kg and/or is discharged.⁶ Depending on the infant's growth at discharge, a nutrient-rich post-discharge formula may be used until three months corrected age, or potentially longer.⁹ It is important that growth restricted infants are monitored and assessed by a paediatric dietitian.

Growth monitoring

Weight gain is an important marker for preterm infants, showing optimisation of nutrition and growth. UK-WHO growth charts for Neonatal and Infant Close Monitoring (NICM), formally known as the Low Birth Weight chart, have been developed to plot the weight of preterm infants from 23 weeks gestation to two years corrected age.¹⁰ As well as measuring and plotting the infant's weight three times a week and length and head circumference weekly, weekly monitoring of serum sodium, potassium, phosphorus, calcium, urea and creatinine, C-reactive protein (CRP), haemoglobin (Hb) and urinary sodium is also required for nutritional assessment. If the infant is receiving parenteral nutrition, routine blood measurements are also essential.¹¹

The management of adequate delivery of energy and protein is really important to ensure optimal growth. However, accelerated growth in preterm infants should be avoided as it can lead to negative long-term health outcomes.¹²

Indications for inadequate growth include:⁶

- Consistent weight loss over several days (other than when diuresis is expected)
- Weight, length and/or head circumference velocity decreases over one week
- Weight velocity alone decreases over two weeks.

Conclusion

Appropriate nutrition for growth and development is fundamental for preterm infants, with any inadequacy in delivery of the correct nutrients potentially implicating long-term health. It is important that healthcare professionals monitor growth and adjust the nutrition accordingly, to ensure optimal development for preterm infants.

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BSNA is the trade association representing the manufacturers of products designed to meet the particular nutritional needs of individuals; these include specialist products for infants and young children (including infant formula, follow-on formula, young child formula and complementary weaning foods), medical nutrition products for diagnosed disorders and medical conditions, including parenteral nutrition, and gluten-free foods on prescription. www.bsna.co.uk

