Welsh Neonatal Network

Clinical Guideline:
All Wales Enteral Feeding Guideline for Preterm Infants

Executive Summary

As survival rates for preterm infants improve, increased emphasis is being put on improving the quality of outcomes, one of which would be optimising nutritional management. Delayed introduction of enteral nutrition can result in nutritional deficits and reduced resistance to infection. Conversely over nutrition and excessive growth acceleration may lead to adverse health issues such as diabetes, obesity and cardiovascular disease in later life. The Welsh Government is committed to giving every child a good start in life and a key aspect of this work is to encourage and support more breastfeeding across Wales.

The goals of nutritional support in the preterm include:

- achieving an acceptable standard of short term growth
- meeting the recognised nutritional requirements of the preterm infant
- preventing feeding-related morbidities, especially the prevention of Necrotising Enterocolitis (NEC)
- optimising long-term outcomes.

Although there is uncertainty around the definitive practice of nutritional support in preterm infants, standardisation of practice across the Welsh Neonatal Network is recommended for two reasons:

- a significant and prolonged decline in the incidence of NEC, has been reported consistently since the implementation of a standardised feeding regimen in the form of clinical practice guidelines
- quality improvement literature suggests that a continuing cycle of process planning, consistent implementation, review and audit of practice is highly effective in clinical medicine.

The parent guideline aims to provide a practical, reproducible framework to meet the nutritional needs of preterm infants regarding the initiation and advancement of feeds. Evidence supporting recommendations can be found in Appendix 2 of the ‘All Wales Enteral Feeding Guideline for Preterm Infants’ (2014).

Nutritional requirements of the preterm infant

The most recent published evidence regarding the nutritional requirements for the preterm infant are Koletzko (2014) and ESPGHAN (2010).

Feeding the preterm infant

When to start feeding
Preterm infants should commence enteral feeding within 24 hours of life unless clinically contraindicated. Infants have been categorised into their risk for feeding and should be fed in accordance with Algorithm 1.

Trophic Feeding / Minimal Enteral Nutrition (MEN)
These are small volumes of milk given to stimulate the bowel, can be maintained for up to 7 days and are not intended to contribute to nutrition. Maximum volume classed as a ‘trophic feed’ is 1ml/kg/day. Trophic feeds should be considered in the very preterm or high risk infant in order to utilise maternal colostrum and stimulate gut trophic hormones. Feeding should commence as soon as possible, unless contraindicated.

Rate of advance of feeding
Current data does not support that slow advancement of feeding in very low birth weight infants (VLBW) reduces the risk of NEC. A rate of increase of 30ml/kg/day is reported as safe for standard risk infants and a period of trophic feeding followed by a rate of increase of 10-20ml/kg/day in high risk infants.

In high risk infants, feeds should be withheld if intolerance to feeds is suspected.

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Assessing feed tolerance

Careful clinical assessment is essential to prevent unnecessary limitations of enteral feeds, which may lead to reliance on parenteral nutrition, delay to full feeding and poor growth. Therefore as aspirate volumes may vary in the early stages of feeding, significant increases in aspirate volume should not be used in isolation when deciding to limit advancement of feeds. Gastric residual volumes and bloody residuals, in combination, represent an early relevant marker for the detection of NEC in VLBW. Refer to the parent document for signs of intolerance, signs of NEC and suggested interventions for possible intolerance. Undigested milk residuals should be re-fed and feeding continued if residual volumes <25% of previous 4 hour feed volume.

Method and frequency of feeding

Gastric administration of feeds is preferred. There is insufficient evidence to support either bolus or continuous feeding but best practice suggests bolus feeding as it is more physiologically normal, infants experience less feed intolerance and have a greater weight gain. In general, infants <32\(^{0}\) weeks should receive 1-2 hourly feeds moving to 3 hourly as they grow.

Milks and Indications for use

Breast Milk

Breast milk expressed by an infant’s own mother is the gold standard of care for preterm infants.

Preterm infants can meet their energy requirements from breast milk alone, if expressing techniques and milk handling are optimised, but not their protein requirements. Infants born <1000g will require 200ml/kg/day to meet requirements for energy. Eventually more protein will be required in the form of multi nutrient Breast Milk Fortifier (BMF), especially in those infants <1500g birth weight. Infants born <1000g would require up to 240ml/kg/day to meet the higher requirements for protein, increasing to 330ml/kg/day after two weeks. Fortification is indicated in order to maintain realistic feed volumes (see Appendix 1 of parent document).

Mothers should be encouraged to breast feed or express their milk within 4 hours of birth, even if their long term intention is not to breast feed. To optimise breast milk production and help to establish their required volume, skin-to-skin contact should be encouraged where possible, and mothers should be advised to express their milk regularly, including one night time expression.

Preterm infants fed exclusively on breast milk should receive supplementary phosphorus which should be titrated against normal serum phosphate and alkaline phosphatase levels.

Breast Milk Fortification

Fortify EBM in all infants <1500g birth weight and <34 weeks gestation.

Consider fortification for infants 1500-2000g birth weight and <34 weeks, and if:

- receiving ≥50% total feeds as breast milk
- tolerating feed volumes at a minimum of 150ml/kg/day – preferably 180ml/kg/day
- serum urea < 4mmol/L and falling.

Infants >2000g birth weight are unlikely to require BMF.

UNICEF recommends that infants should be tolerating full enteral feeds before BMF is added and not to consider fortification until the infant has received at least 2 weeks of exclusive mother’s milk. It is at the discretion of the clinician to introduce BMF before this stage.

Check plasma urea levels weekly to monitor levels and the effect of BMF.

BMF does not need to be added if more than half of the feed requirement is provided by a preterm formula. However, it can be considered if there is associated poor growth and tolerance of volume. In practice this would depend on having adequate volumes of milk to fortify accurately.

Do not add BMF as a supplement to preterm formula.

Criteria for stopping BMF:

- receiving <50% total feeds as EBM and growth satisfactory
• if growth not satisfactory continue BMF until <25 % total feeds EBM
• able to fully demand breast feed
• at discharge together with satisfactory growth
• assess infants individually to see if BMF post discharge may be of benefit.

BMF is not prescribable in the community and is generally discontinued at the time of discharge.

**Donor Breast Milk (DBM)**
The use of DBM is inconsistent in Wales and there is no established current practice.

The nutritional content of DBM compared to maternal EBM is variable but if premature DBM is available, this should be used.

**Indications for use of DBM include:**

- gestational age <28\(^{+0}\) weeks
- extremely low birth weight infants < 1000g
- previous proven NEC
- <32\(^{+0}\) weeks and intra uterine growth retardation
- <34\(^{+0}\) weeks and with absent/reversed end diastolic flow.

**Preterm Formulas**
When no breast milk is available, infants born <34\(^{+0}\) weeks and/or <2000g at birth should be fed preterm formula. There is no evidence to support the use of term, semi-elemental or elemental formulas for these infants.

There are no recommendations for infants born between 34\(^{+0}\) and 37\(^{+0}\) weeks gestation. Nutrient stores are better and these infants are likely to establish feeding more quickly than those born <34\(^{+0}\) weeks gestation, so maternal breast milk is the feed of choice. In the absence of this, use a term infant formula. Assess growth restricted infants born between 34\(^{+0}\) and 37\(^{+0}\) weeks gestation on an individual basis as they can be offered a term infant formula. For infants with poor growth, consider using a high energy term infant formula. Growth restricted term infants >37\(^{+0}\) weeks should also be offered term infant formula in the absence of maternal milk.

See parent document for further information if a combination of formula feed and EBM is required.

Infants who have faltering growth should be referred to a Paediatric Dietitian for assessment and advice.

**Nutrient Enriched Post Discharge Formulas (NEPDF)**
At the time of discharge many infants born 34\(^{+0}\) weeks and <2000g may require some formula milk to supplement breast milk. When infants reach 1800-2000g they would be changed to a NEPDF. These formulas are prescribable in the community whereas preterm formulas are not.

Whilst in hospital the NEPDF is available ‘ready to feed’ but on discharge this is changed to a powdered formulation.

NEPDF can be continued until catch up growth has been achieved and then changed to a standard infant formula. Stop these milks by 6 months corrected age. In general when an infant has been weaned and is having 3 meals per day the NEPDF can be discontinued.

If catch up growth has not been achieved during this time consider referral to a Paediatric Dietitian.

**Specialist term infant formulas**
Specialist term infant formulas should only be used where absolutely necessary and under the direction of a Paediatric or Neonatal Dietitian. These formulas are not designed for use in the preterm population so will not fully meet their nutritional requirements. Energy needs might be met by increased volumes, but are often poorly tolerated. These formulas can be concentrated but this will not address the nutrient imbalance. Infants requiring these feeds may include post-surgery infants and infants with feed intolerance or suspected cow’s milk allergy.

Soya formulas are not recommended for infants unless specifically required for treatment of hereditary lactase deficiency or as part of a vegan diet.

All infants born <35\(^{+0}\) weeks will need vitamin and iron supplementation according to local health board policy.