Neonatal nutrition

Enteral feeding, vitamins and minerals

See resources and eHandbook for further details

Type of feed

- Preference for Breast Milk
  - *Why do you think this is?*
- Artificial feed/ formula
  - Preterm/ term/ Low birth weight (LBW)
  - Different composition
    - Lactose free
    - Soy
    - Hydrolysed/ extensively hydrolysed

Route of feed – oral/ ng?

- **Suck:**
  - breast feeds (preferable)
  - other forms of suck feeds (bottle, pipette or finger feeding) if an infant has an adequate and safe ability to suck
- Sucking starts from 34/35 weeks onwards and should be increasingly effective from 36 weeks onwards
- NG/ Gavage: if an infant is unable to suck safely and efficiently
- Via indwelling orogastic or nasogastric (preferred) tubes.

Timing, volume and frequency

Table 1: Enteral feeding volumes for neonates > 1500g

Day of Life	Term (mls/kg/day)	Preterm (mls/kg/day)	Small for Gestational Age (mls/kg/day)
1	30	60	60
2	60	80	90
3	90	100	120
4	120	120	140
5	150	150	160
6	150	180	180
~ 7 – 14 + days	150	180	200 - 220

Route and feed frequency

Term (usually > 2500g)	Suck	4 hourly / on demand
Preterm (1500 – 2500g)	Suck/gavage	3 hourly
Preterm (1000 – 1500g)	IV fluids, then gradual gavage	2 hourly

Term babies

- Feed soon after birth
- The well term infant is able to suck feeds and is usually fed at 4 hourly intervals or by demand
- Volumes are typically 30-40mL/kg on the first day, increasing by 30mL/kg/day to 150mL/kg/day at the end of the first week
- Term IUGR infants (< 2500g at term) may have higher requirements to initially maintain blood sugar and later to gain weight appropriately (up to 220 ml/kg/d).

Preterm 1.5-2.5kg

- Feed soon after delivery
- If not possible, intravenous fluids (initially as 10% dextrose) may be needed until adequate oral intake is established
- Infants < 36 weeks may require gavage feeds (EBM or formula if parent's consent) at 3 hourly intervals and suck feeds if and when able.
- Fresh EBM is used whenever possible, as frozen breast milk lacks some of the immunological advantages of fresh breast milk
- Volumes usually given are 60mL/kg on day 1, increasing to 160mL/kg by the end of the first week. Feeds may be increased to 180 ml/kg/d and occasionally higher volumes to achieve adequate growth (10-15g/kg/d once full feeds established)
- **Fortification of feeds** will be considered for babies with birthweight < 2000g and SGA, or with poor weight gain or problems tolerating adequate feed volumes
- *See notes section/ eHandbook for preterm <1.5kg*

Standard infant formula

- Eg S26, Nan, Karicare have a lactalbumin:casein ratio of 60:40 similar to breast milk.

- Infant formulas have iron and vitamins added. Most term babies who are predominantly formula fed, do not require further supplements.

- *Many formulas (eg 'Gold') also contain omega-3-fatty acids or probiotics. Manufacturers claim benefits in terms of 'neurodevelopment' and 'immunological health', but evidence for benefits in otherwise normal healthy is slim.*

Hydrolysed formula

- Extensively hydrolyzed and amino acid formulas are appropriate to treat cows milk protein allergy or conditions like food protein-induced enterocolitis/proctitis syndrome (FPIES), or eosinophilic oesophagitis (EOS)

- These formulas are only available on authority prescription by a paediatrician, gasto-enterologist or allergist

- Soy formulas may be suitable alternatives in ‘allergic’ babies over 6 months of age

Fortification of EBM

- *Babies <1500 grams at birth or < 2000g and SGA*

- Provides additional calories, protein, calcium and phosphate.

- Commence once the infant is at least 14 days old and tolerating 120ml/kg/d of feeds.

- Powder fortifier (eg HMF = Human Milk Fortifier, FM85) added to EBM (1 sachet (25g) added to 100mL of EBM) increases the caloric content by ~ 20 kcal/100mL to ~80kcal/100 ml).

Fortification

- FM85 significantly changes the osmolarity of EBM, which may contribute to feed intolerance. It is therefore recommended that fortifier is inititally added at half strength. Full strength fortifier is used after 2 days of tolerating ½ strength

- For small preterm babies on formula feeds, the formula is changed to a low birth weight preparation once full volume feeds are tolerated

- Fortification/low birthweight formula is usually stopped when good weight gain is occurring and neonate weight is above 2000- 2500gms. This usually occurs before discharge home.

Growth for SGA/ LBW babies on formula

- For small preterm babies on formula feeds, the formula is changed to a low birth weight preparation once full volume feeds are tolerated

- Fortification/low birthweight formula is usually stopped when good weight gain is occurring and neonate weight is above 2000- 2500gms. This usually occurs before discharge home

Caloric content of feeding solutions

For growth to occur the resting infant needs at least 100-120kcal/kg/day.

Formula	**kcal/100mL**
Expressed breast milk (EBM)	67
NAN 1	67
S26	67
Pregestimil	67
Nutramigen	67
Prosobee	67

The above formulas are also known as "20 Calorie" feeds (i.e. 20kcal/30mL). They may be, on occasions, made up in a more concentrated form to what was known as "25 Calorie" feeds.

Formula	**kcal/100mL**
S26 Low Birthweight Formula	83
EBM plus Fortifier (Enfamil Human Milk Fortifier)	81

Vitamins

- A premature infant's daily breast milk or breast milk substitute intake will not supply the necessary daily vitamin requirements

- Vitamin D (eg osteovit D) for all preterm ; mother vitamin D deficient or with dark skin pigmentation
  - Commence d 5 of enteral feed

- Pentavite is administered to all infants < 32 weeks, < 2kg at birth or whose mother is Vitamin D deficient.
  - Commence on day 5 of enteral feeds and when intralipid is ceased.
  - Administer 0.45mL daily during the feed nearest to 1000 hours.
  - Continue throughout the first 12 months of life.

Ferrous sulphate 150mg/5ml

- Premature infants have been deprived of the intra-uterine accumulation of iron and can become rapidly depleted of iron when active erythropoiesis resumes

- Administer prophylaxis to all infants < 32 weeks or < 2kg at birth

- Commence on day 14 only if feeds are fully established (tolerating 150mL/kg/day for 1 week)

  - Administer 0.5mL/kg (3mg/kg elemental iron) daily during the feed nearest to 1000 hours
  - Administration is continued after discharge from Intensive and Special Care Nurseries
  - Exclusively breast-fed infants, until established on solids
  - Formula fed infants, until 3 months post-discharge

- Treatment dose is 0.5mL/kg 12 hourly (6mg/kg/day elemental iron)