ENTERAL FEEDING IN NEONATES

Introduction

- the goal of nutrition is to achieve as near to normal weight gain and growth as possible
- enteral feeding should be introduced as soon as possible. This means starting in the labour room itself for the well infant
- breast milk is the milk of choice. All mothers should be encouraged to give breast milk to their newborn babies
- the calorie requirement : Term infants: 110 kcal/kg/day
  Preterm infants : 120 – 140 kcal/kg/day

Type of milk for Newborn feeding

There are three choices:

- expressed breast milk
- normal infant formula
- preterm infant formula

Breast Milk

Breast milk is preferred as studies have shown that breast fed babies had low risk for necrotising enterocolitis and had better development quotients. However, expressed breast milk (EBM) alone is not adequate for the nutritional needs of the very preterm infant as it:

- has insufficient calories and protein to ensure optimal early growth at 20 kcal/30mls
- has insuffiecient sodium to compensate for high renal sodium losses
- has insufficient calcium or phosphate - predisposes to osteopenia of prematurity.
- is deficient in vitamins and iron relative to the needs of a preterm infant

Human Milk Fortifier (HMF)

- It is recommended to add HMF to EBM in babies < than 32 weeks or < 1500 grams.
- HMF will give extra calories, vitamins, calcium and phosphate.
- HMF should be added to EBM when the baby is feeding at 75 mls/kg/day.
- VLBW infants on exclusive breastmilk may require sodium supplementation until 32-34 weeks corrected age.

Infant Formula

Infant formula should only be given if there is no supply of EBM. There are 2 types of infant formula: Preterm formula and Normal Term Formula.

- preterm formula : for babies born < 32 weeks or < 1500 grams.
- normal infant formula : for babies born > 31 weeks or > 1500 grams.

Strategies of administering enteral feeding

Orogastric Route

Neonates are obligate nose breathers thus nasogastric tubes can obstruct the nasal passage and compromise breathing. Thus the orogastric route is preferable.

Continuous vs. intermittent bolus feeding

Bolus fed babies tolerate feeds better and gain weight faster. Babies on continuous feeding have been shown to take longer to reach full feeding but there is no difference in days to discharge, somatic growth and incidence of necrotising enterocolitis (NEC).

Cup feeding

If baby is able to suckle and mother is not with the baby, cup feeding is preferable to bottle feeding to prevent nipple confusion.

Table 1. Composition of various milk

component		cow's milk	standard formula	preterm formula	mature breastmilk
carbohydrate	g/100ml	4.6	7.5	8.6	7.4
fat	g/100ml	3.9	3.6	4.4	4.2
protein	g/100ml	3.4	1.5	2.0	1.1
casein/lactalbumin ratio		4:1	2:3	2:3	2:3
calories	/100ml	67	67	80	70
sodium	mmol/L	23	16	33	15
potassium	mmol/L	40	65	33	64
calcium	mg%	124	46	77	35
phosphate	mg %	98	33	41	15
iron	mg%	0.05	0.8	0.67	0.08

When to start milk?

- as soon as possible for the well term babies
- however in the very preterm infant there is a concern of increase risk of NEC if feeding is started too earlyadvanced too rapidly, although early feeding with EBM is to be encouraged. Studies have suggested that rapid increment in feeding has a higher risk for NEC than the time at which feeding was started.
- minimal enteral feeding (MEF) is recommended in very preterm infants. The principle is to commence very low volume enteral feeds on day 1 - 3 of life (i.e. 5 - 25 mls/kg/day) for both EBM and formula milk. MEF enhances gut DNA synthesis hence promotes gastrointestinal growth. This approach allows earlier establishment of full enteral feeds and shorter hospital stays, *without any concomitant increase in NEC.*

How much to increase?

- generally the rate of increment is about 20 to 30 mls/kg/day.
- well term babies should be given breast feed on demand.
- milk requirements for babies on full enteral feed from birth:

Day 1	60 mls/kg/day
Day 2 – 3	90 mls/kg/day
Day 4 – 6	120 mls/kg/day
Day 7 onwards	150 mls/kg/day

  Add 15% if the babies is under phototherapy
- in babies requiring IV fluids at birth: The rate of increment need to be individualized to that baby. Babies should be observed for feeding intolerance (vomit or large aspirate) and observe for any abdominal distention before increasing the feed. to feed intolerance or fluid overload.
- infants that require high calories due to increase energy expenditure e.g. chronic lung disease, should consider adding polycose and MCT.

What is the maximum volume?

- the target weight gain should be around 15g/kg/day (range 10-25g/kg/day). Less than this suggests calories need increasing. More than this should raise the possibility of fluid overload particularly in babies with chronic lung disease.
- preterm infants
  - increase feed accordingly to 180 to 200 mls/kg/day.
  - if on EBM, when at 75 mls/kg/day: add HMF
- term infant
  - allow demand feeding

Notes:

- in a randomised trial in babies < 30 weeks comparing remaining at a final feed volume of 150 ml/kg/day (120 cal/kg/day) to advancing to 200 mls/kg/day, it was noted that half the 200 mls/kg/day group had to be cut back (to a mean of 180 mls/kg/day) due

When to stop HMF or Preterm Formula?

Consider changing preterm to standard formula and stop adding HMF to EBM when babies are breastfeeding on demand or have reached their expected growth curve.

Vitamin and mineral supplementation.

- *Vitamins*: a premature infant's daily breast milk/ breast milk substitute intake will not supply the daily vitamin requirement. Multivitamin can be given after day 14 of life when on feeding of 150 ml/s kg/day.
  Vitamin supplements at 0.5 mls daily to be continued for 3-4 months post discharge.
- *Iron:* Premature infants have reduced intra uterine iron accumulation and can become rapidly depleted of iron when active erythropoiesis resumes. Therefore babies of birth weight < 2000g should receive iron supplements.
  Iron is given at a dose of 3 mg/kg elemental iron per day.
  - Ferric Ammonium Citrate (400mg/5mls) contains 86 mg/5 mls of elemental iron.
  - start on day 42, continue until 3-4 months post discharge or until review by doctor
  - Babies who have received multiple blood transfusions may not require as much iron supplementation.

Special Cases

- IUGR babies with reversed end-diastolic flow on antenatal Doppler: Studies have shown that these babies are at risk of NEC. Thus feeds should be introduced slowly and initially use only EBM.