

# Neonatal Nutrition Guidelines - National Women's Health Newborn Services

## Intravenous nutrition

**All babies <37 weeks' gestation with delay in reaching full enteral feeds or birthweight <1,500 g:**

Initiation of amino acid and lipid within 12 hours of birth

**Infants ≤1,000 g:** Starter solution from Day 0 at 30 ml/kg.day providing 2 g/kg.day protein and lipid at 1 g/kg.day via central venous line or umbilical venous catheter. After ~48 hours Starter solution is changed to P100 (amino acid and dextrose solution). Over the next few days P100 increases to a maximum of 96 ml/kg.day (4 g/kg.day protein).

**Infants >1,000 g or infants ≤1000 g without central venous access:** P100 from Day 0 (51 ml/kg.day providing 2 g/kg.day protein)  
Over the next few days P100 increases to a maximum of 90 ml/kg.day, providing 3.8 g/kg.day protein in infants >1,000 g or to a maximum of 96 ml/kg.day in babies ≤1,000 g, providing 4 g/kg.day protein.

## Recommended volumes for babies <37 weeks' gestation

	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
<b>Fluid ml/kg.day</b>	60	75	90	105	120	150	180
<b>Lipid (SMOF)</b>	1 g/kg.day	2 g/kg.day	3 g/kg.day (continue 3 g/kg.day lipid until the day IVN finishes; do not chart lipid on the day P100 will finish)				

## Enteral nutrition for preterm (<37 weeks' gestation) or low birthweight (<2,500 g at birth)

<b>Reasons to withhold feeds</b>	Bile stained aspirates (see Withholding Feeds Guideline )
<b>Start enteral feeds</b>	Within 24 hours of birth (can wait up to 72 hours for breastmilk)
<b>Feed type 1st choice</b>	Expressed breastmilk (EBM)
<b>If born at &lt;32 weeks' gestation OR birthweight &lt;1,800 g</b>	Add breastmilk fortifier when feed volume reaches 5 ml per feed. 1 packet FM85 fortifier added to 25 ml EBM
<b>If breastmilk not available</b>	<b>If born at &lt;32 weeks' gestation OR birthweight &lt;1,800 g</b> start feeds with preterm formula (PTF). Otherwise use term formula (NIF).
<b>Starting volume, feeding route and frequency</b>	Begin 1 ml bolus feeds 2 – 6 hourly (as extra fluid) via nasogastric or orogastric tube and increase as tolerated until 1 ml 2 hourly. Feed volume then increased by 1 ml, every 6 to 24 hours.
<b>Probiotics</b>	Start Labinic 0.16 ml once daily for babies ≤ 32 weeks' or ≤ 1,500 g once tolerating > 1 ml q4 hourly. Continue until 36 weeks' gestation or discharge.
<b>Recommended increase</b>	20 – 35 ml/kg.day per 24 hours (see table below)
<b>Breastmilk fortifier duration</b>	Fortifier use reduces as the baby transitions to breastfeeds and stops at discharge. There is no need to cease fortifier at a specific weight. Consider reducing feed volume to 150 ml/kg.day if the baby is inappropriately crossing centiles upward.
<b>Preterm formula duration</b>	If the baby is growing well preterm formula can be stopped at 36 weeks' CGA (or earlier if crossing centiles upwards but consider reducing feed volume first). Consider post discharge formula if born at <33 weeks' CGA or <1,500 g birthweight.
<b>Growth monitoring</b> <i>At any time if growth is inadequate, consider referral to dietitian</i>	Weight – Level 3 alternate days; Levels 1 and 2 twice weekly. Length (with neonatometer when feasible) and head circumference – weekly, plotted on growth chart.
<b>Iron supplementation</b>	Started 2 weeks after birth [1-3] <u>unless</u> on FM85 Fortifier or preterm formula feeds (as these both contain sufficient iron for prophylactic dose). Starting dose is 0.5 ml/kg.day ferrous sulphate (3 mg/kg.day elemental iron).  Iron-deficiency anaemia: increase dose to 1 ml/kg.day ferrous sulphate (6 mg/kg.day) or commence ferrous sulphate at 0.5 ml/kg.day (3 mg/kg.day) in babies receiving FM85 or preterm formula.
<b>Vitadol C in NICU</b>  <i>Based on 2010 ESPGHAN recommended nutrient intake for Vitamin D 800 – 1000 IU per day</i>	1. For all babies on any oral feed, start <b>Vitadol C 0.4 ml once per day</b> , the day after SMOF lipid finishes. 2. For all babies not on intravenous nutrition or <1500 g, start <b>Vitadol C 0.4 ml once</b> daily when enteral fed volume reaches 8 ml. 3. When weight reaches 1500 g reduce <b>Vitadol C to 0.2 ml once per day</b> .  Babies on all other feeds (e.g. unfortified EBM, term or hydrolysed formula, which have much lower levels of vitamins and minerals) or fluid restricted to <150 ml/kg.day need individual assessment of vitamin D intake to prescribe Vitadol C. Other nutrients e.g. folic acid are not given routinely.
<b>Prescribe on discharge</b> for preterm (<37 weeks' gestation) or <2,500 g at birth	Vitadol C 0.3 ml once per day (and remain at this dose until first birthday) Ferrous sulphate 0.5 ml/kg/day (3 mg/kg/day of elemental iron) to be increased as weight increases. <i>Vitamin and iron supplements should be continued until the infant's first birthday.</i> [4]

## Recommended speed of increasing feeds

Weight	Increase by <30 ml/kg.day
<800 g	1 ml per feed per 24 hours
800 - <1250 g	1 ml per feed per 12 hours
1250 - <1750 g	1 ml per feed per 8 hours
1750 g - 2500 g	1 ml per feed per 6 hours

### Please note

- Lipid emulsions have a low osmotic load and are isotonic. Amino acid and dextrose solutions are hypertonic. Therefore the co-infusion of lipid with P100 and dextrose into peripheral veins is encouraged and may also exert a protective effect on vascular endothelium to prolong venous patency and reduce risk of thrombophlebitis [5][6].
- Some infants with a gestation at birth  $\geq 32$  weeks and birthweight  $\geq 1800$  g may require fortifier or preterm formula to ensure adequate growth
- Some infants who are demand feeding will take volumes in excess of 200 ml/kg.day of expressed breastmilk or term formula.
- FM85 fortifier added to 180 ml/kg.day EBM supplies 3 mg/kg.day iron; therefore, if 0.5 ml/kg.day ferrous sulphate (prophylaxis dose) is added, this will provide 6 mg/kg.day iron (treatment dose).

Newborn Services, Auckland City Hospital

October 2017

### References

1. Arnon S, Shiff Y, Litmanovitz I, Regev RH, Bauer S, Shainkin-Kestenbaum R, Bental Y, Dolfen T: **The efficacy and safety of early supplementation of iron polymaltose complex in preterm infants.** *American Journal of Perinatology* 2007, **24**(2):95-100.
2. Joy R, Krishnamurthy S, Bethou A, Rajappa M, Ananthanarayanan PH, Bhat BV: **Early versus late enteral prophylactic iron supplementation in preterm very low birth weight infants: a randomised controlled trial.** *Arch Dis Child Fetal Neonatal Ed* 2014, **99**(2):F105-109.
3. Anabrees J: **Early Enteral Prophylactic iron Supplementation May be Preferred in Preterm Very Low Birth Weight Infants.** *J Clin Neonatol* 2014, **3**(1):14-15.
4. Agostoni C, Buonocore G, Carnielli VP, De Curtis M, Darmaun D, Decsi T, Domellof M, Embleton ND, Fusch C, Genzel-Boroviczeny O *et al*: **Enteral nutrient supply for preterm infants: commentary from the European Society of Paediatric Gastroenterology, Hepatology and Nutrition Committee on Nutrition.** *J Pediatr Gastroenterol Nutr* 2010, **50**(1):85-91.
5. Pineault M, Chessex P, Piedboeuf B, Bisailon S: **Beneficial effect of coinfusing a lipid emulsion on venous patency.** *JPEN Journal of parenteral and enteral nutrition* 1989, **13**(6):637-640.
6. Pittiruti M, Hamilton H, Biffi R, MacFie J, Pertkiewicz M, Espen: **ESPEN Guidelines on Parenteral Nutrition: central venous catheters (access, care, diagnosis and therapy of complications).** *Clin Nutr* 2009, **28**(4):365-377.