

NICU Nutrition Highlights for Preterm Infants

Total Fluid (TF) (ml/kg/day) *general guidelines for IV fluids:*

- **DOL 1:** 80 ml/kg/day (more if hypotension or hypernatremia);
- **DOL 2:** 100 ml/kg/day, ↑ protein and lipids per chart. Check TG’s.
- **DOL 3:** 120 ml/kg/day, continue to advance DDR, protein, IL if tolerating
- **Lytes:** Start Ca++ at 2-3 mEq/kg/day. If BW < 1200 gm, caution before adding Na, K, and Cl: “If in doubt, leave it out.” Can’t max acetate without cations.

Central TPN: + Heparin; ↑ DDR gradually to 10-12 mg/kg/d, Troph to 3-4 gm/kg, IL to 3 gm/kg. Calcium can usually go up to 3-4 mEq/kg and P usually up to 2.5-3.5 mEq/kg

PIV : recommended limits: D10, 3 gm/kg Trophamine, 3 mEq/kg calcium. Strict limit: 1200 mosmols for a PIV. If TPN needed > 7 days, get Central access.

Dextrose: calculate Dextrose delivery rate (DDR), also known as Glucose Infusion Rate, in mg/kg/min: $\frac{\% \text{ Dextrose} \times \text{rate (ml/hr)}}{6 \times \text{wt (kg)}}$ (Used to avoid hypo, or hyper-glycemia, and under-, or overfeeding)

Preterm: start DDR @ 4-6 mg/kg/min, advance (as tolerated) by ½ - 1 mg/kg/min daily to goal of 10 - 12.
 Term: start DDR 6-8 mg/kg/min, advance by 2 – 3 mg/kg/min daily to goal of 10 - 12.

Protein for Preemies: Trophamine has L-cysteine which ↑ solubility of Ca and P, is conditionally essential A.A. for preemies. Since it lowers pH, may “hold L-cysteine” in ELBW infants if persistent metabolic acidosis and limited acetate in TPN (ie, no cations).

Birthweight	Start Trophamine	Advance	Goal
< 1000 gm	2 gm/kg	1 – 1.5 gm/kg/d	3.5 – 4* gm/kg/day
≥ 1000 gm	2 – 3 gm/kg	1 – 1.5 gm/kg/d	3.5 – 4* gm/kg/day

*4 gm/kg IF Central Line, metabolic acidosis controlled, BUN < 40

Electolytes & Minerals: MIS range for Na, K, Cl is too high for starting in most preemies!

Na, K, Cl: start 0 or 1 mEq/kg unless: older baby, known deficit; √ art line content
 Ca and Phos: usually start 2-2.5 mEq/kg Ca & 0.5 – 1 mmol/kg P, ↑ to goals
 Mg: if mom was given Mg++, then hold til WNL.

QUICK FACTS:
 NS = 154 mEq/L of Na and of Cl
 ½ NS = 77 mEq/L of Na and of Cl
 ¼ NS = 38 mEq/L of Na and of Cl

Balancing cations and anions:

- every 1 mEq of Na in TPN “buys” ~ 1.5 mEq of anion (P, Cl, acetate)
- every 1 mEq of K in TPN “buys” ~ 1.39 mEq of anion
- After the P is “filled”, remainder is matched with acetate/chloride, per order

Lipid: IV fat = concentrated calories & essential fatty acids.

5 mls = 1 gm of fat, so 1 gm/kg = 5 ml/kg; 2 gm/kg = 10 ml/kg; 3 gm/kg = 15 ml/kg

Birthweight	Start	Advance	Goal
< 1000 gms	1 g/kg/d	0.5-1 g/kg/d	3 g/kg/day
≥ 1000 gms	2 g/kg/d	1 g/kg/d	3 g/kg/day

If TG level is > 200 and < 300, decrease by 1 g/kg and recheck. If TG is > 300, decrease to 0.5 -1 g/kg/day (minimum for essential fatty acid) and recheck.

Note: the “First Choice TPN” avail for new admits post-TPN pharmacy hours is to be run only at 50 ml/kg/day; requires additional fluid to make up balance of TF.

Enteral Nutrition Protocols: when do we not feed?

Less than 1200 grams, Trophic Feeding Protocol:

Day of feeding	Schedule	Volume
1 & 2	2 ml/kg q 3 hrs	16 ml/kg
3 & 4	2 ml/kg q 2 hrs	24 ml/kg

Standard Feeding Protocol

Birth Weight	Schedule & Advance
< 1200 grams	Trophics x 4 d; Advance by 1 ml/kg q 12 hrs.
1200 - <1800 gms and < 35 weeks	2 ml/kg q 3 hrs; Advance by 1 ml/kg q 9 hrs.
> 1800 gms and ≥ 35 weeks	5 ml q 3 hr; Advance by 5 ml q 6 hrs.

Typical enteral needs for Premature infants: 120 kcal/kg, 3-4 gm/kg protein, 120-230 mg/kg calcium and 60-140 mg/kg Phos. This is ~ 2 -3 x the protein & mineral needs of a term infant. How do we meet these needs?

√ When TPN/IVF d/c'd or KVO, ↑ Total Fluid limit from IV-based (parenteral) to an enteral TF goal: ie: d/c TF = 120 ml/kg/d, and order TF = 150 ml/kg/d

At 150 ml/kg/day, 24 cal/oz premature formula, breast milk fortified to 24 cal/oz, (or term 24 cal/oz for term infant) each provide goal calories. Fortifier (HMF) adds cal, pro, minerals and vits to breast milk. Currently in our NICU, we do not start HMF until tolerating 120 ml/kg/day. Tolerance includes adequate stooling.

1 pkt HMF/50 mls EBM=22 cal/oz

1 pkt HMF/25 mls EBM = 24 cal/oz (and goal protein, minerals, etc)

For the older preemie with BW ≥ 2 kg:

165 ml/kg/day of 22 cal/oz feeding (EBM 22 or transitional Neosure/Enfacare 22),

This is appropriate for the older preemie, taking all PO or close to d/c. Meets calorie goal, less protein & minerals but appropriate for the “graduating” preemie.

What about the breast feeding preemie ready for d/c? If EGA was < 34 weeks and/or BW < 1500 gm, likely needs supplementation at home. See Handout.

Fluid-restricted: 135 ml/kg/day @ 27 cal/oz = 120 kcal/kg. Occasionally 30 cal/oz. These all require RD consult for optimal method and evaluation of nutrient delivery.

Term: 180 ml/kg/day @ 20 cal/oz is typical goal unless either ↑needs, or ↓ intake. Then concentrated term formula or breast milk.