

Small Baby FEN Guidelines (< 28 wks or < 1000 grams)

v.10-27-20

DOL: 0 (0-24 hrs)

- Admission:
 - Place central lines, UAC and double lumen UVC.
 - Via UAC: infuse (0.45%) Na Acetate w/ 1-unit heparin/ml @ 0.8 ml/hr (goal rate is 0.5ml/hr to minimize non-nutritional fluid admin, decrease rate as soon as tolerated, ideally by DOL 1.
 - Admission labs:
 - ABG and glucose. CBC at 6 hrs of age.
 - CBC on admit if PIH, IUGR, TTT, blood loss or hypotension.
- Labs (see SBG Lab Draw Recs for additional detail):
 - POCT Chem 8 at 12-hrs of age; establish trend with POCT lytes.
 - BMP, gas with Ical at 24 hrs of age; if IUGR: add Phos by 24-48 hrs.
 - Avoid heel sticks if possible.
- Fluid / Nutrition Goal:
 - Initial Total Fluid: 100-120 ml/kg includes UAC fluids @ 0.8 ml/hr (see above).
 - SPN D5% AA3.5% @ 90-100 ml/kg provides GIR: 3.1-3.5, 3.1-3.5 g pro/kg, 28-31 kcals/kg.
 - SPN D10% AA3.5% @ 80-100 ml/kg provides GIR: 5.5-6.9, 2.8-3.5 g pro/kg, 38-48 kcals/kg.
 - *Goal to start custom PN & IL before end of first 24-hrs (to allow Calcium, Phos, K).*
 - *Start oral care with colostrum as soon as available. Start trophic feeds (EBM or DHM) by 6-hrs @ 10 ml/kg (every 6hrs); maintain until ready to initiate FAT.*

DOL: 1-5 (24hrs – 5 days) Transition Phase: (may last 3- 5 days or slightly longer)

- If BW < 750 grams, greater insens losses; start TF @ 100-120 ml/kg or more; up to 140-160 ml/kg.
- If BW 750 – 1000 grams, start TF @ 100 ml/kg; may require up to 140-160 ml/kg during this phase.
- Total Fluid – advance fluids cautiously - only 10-20 ml/kg/day (or restrict) based on GA, BW, % wt loss/insensible losses/diuresis/UOP, Na level, feeds.
- **Fluid:** Increase (or restrict) free water in response to Na Goal of 135-145 mEq/L
 - *if < 135, consider decreasing the fluid intake
 - *if > 145, consider increasing the fluid intake
 - Aim to maintain Na < 155 mEq/L (Bhatia J 2006)
 - Be aware of extraneous Na-intake (drips) (*No need for additional Na for the first 2-3 days of life except to provide Phos and Acetate*).
 - Use Humidity per guidelines. See Skin and Thermoregulation section.
- **Calcium/Phos:** Provide Phosphorous to support AA and Dextrose metabolism.
 - Phos: 1-1.6 mMol/kg (use 0.5-1 mEq/kg each of Na & K).
 - *K-Phos can be added to custom PN, once UOP established.*
 - *If able to provide Phos of 1-1.6 mMol/kg, Calcium will be max of: 1.6-2.5 mEq/kg*
 - *Refer to **Table 1** for Ca:Phos 0.8:1 molar ratio dosing.*
- **Acid-Base Balance:** Adjust Acetate (OAC) within PN to maintain serum CO₂ within goal of 18-24.
- **GIR:** Minimum of 5mg/kg/min. Advance 0.5-1 mg/kg/min per day if glucose is ≤150; (goal BG: 80-120).
 - If hyperglycemia develops manage per ELBW Hyperglycemia Mgmt and ELBW Insulin Drip Guidelines. Tolerate glucoses 150-250.
 - Avoid hypoglycemia.
- **AA:** Advance to 3.5-4 grams pro/kg (only restrict if Cr > 1.5).

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- **Lipids/TG monitoring:** Safe to start lipids DOL 0-1.
 - If less than 1000 gm, SGA/IUGR, given post-natal steroids, presumed sepsis:
 - Follow triglyceride levels, checking after reaching 1, 2 and 3 gm/kg/day for infants <750gm. If 751-1000gm, check level at 2 gm/kg/day and additionally only if abnormal or borderline elevated.
 - Goal of < 250. Hold advance or decrease IL 0.5-1 g/kg if TG level ≥ 250-400.
 - If TG level is > 400, aim to provide 0.5 gm/kg/day to meet EFA goals; do not omit longer than 24-hrs.
- **Labs:**
 - POCT Chem 8 q 6-24 hours for the first 3 days of life then at least q am while nutritional adjustments are being made.
 - Check Phos at 5 days of age; if IUGR check Phos at 24hrs. If IUGR/SGA, hypercalcemia, or hyperglycemia, may trend Phos more regularly.
- **Feeds:** Begin trophic feeds (or FAT) if not hypotensive or on pressors. Use mother's milk or donor milk whenever possible.
- Avoid use of glycerin enemas if possible; (if ordered, administer with use of feeding tube not syringe).

DOL 5-14: Stabilization Phase (ECF contraction/diuresis complete/Regain to BW)

- Start to require Na & K in greater amounts:
 - Na: 2-3 mEq/kg
 - K: 1.5-2 mEq/kg (more if SGA/low Phos/refeeding syndrome)
 - Ca:Phos:
 - Continue invert (0.8:1 ratio) – **see Table 1**
 - May advance total amounts if Phos value AND i-Ca support Ca increase (see table 1 for 0.8:1 molar ratio).
- Nutrition Goal: 90-110 kcal/kg, 3.5-4 g pro/kg by DOL 7.
- Ca:Phos - recheck Phos by DOL 7:
 - *Needs to be > 1 wk old, not IUGR & trend of 2 Phos values > 5, to allow advance to 1:1 – 1.2:1 molar (refer to Table 2).*

DOL 10-14/beyond: Growth Phase

- Aim to match intrauterine growth rate *and prevent EUGR - wt gain goal ≥ 18-22 g/kg/day.*
- Hyponatremia (now more likely reflects insufficient Na intake vs. fluid changes).
 - Na: 3-5 mEq/kg (up to 7 mEq/kg).
- Other Lytes:
 - K: 2-4 mEq/kg.
 - Ca:Phos – if infant remains on PN > DOL 10-14 without fortified feeds, need to address if can go to 1:1 molar ratio & goal of Ca 3-3.8 mEq/kg & Phos 1.6-1.8 mMol/kg (see 1:1.1 table).
 - Note: if PHOS > 5 (x2 labs), infant is only on 22 kcal/oz feeds, can decrease Ca within PN, but will still require Phos intake of 1-1.6 mMol/kg, until on 24 kcal/oz fortified feeds. *Consult RD for assistance.*
- EN continues to advance; PN starts to decrease.
- Nutrition Goal (EN+PN): >105-125 kcal/kg, 3.5-4.5 g pro/kg.
- Oral Feedings per attached BBFA (Breast and Bottle Feeding Algorithm)

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TPN Guidelines – Small Baby (< 28 weeks, or < 1000 grams)

DOL	Total Fluid (ml/kg)	SPN/custom	GIR	AA (g/kg)	Lipids (g/kg)	Electrolytes	Labs for following day (tomorrow's AM draw)
<i>first 24-hrs</i>	100-120 ml/kg <i>*includes SPN or UAC fluids *start EBM or DHM by 6-hrs.</i>	SPN @ 80-100 ml/kg <i>*UAC or other for difference</i>	4-5	2.8-3.5	n/a, or if fluid available start at 0.5 <i>*use SMOF if high D bili</i>	n/a in SPN +/- Ca 1-2 mEq/kg	BMP, iCal; <i>if IUGR/SGA: add Phos</i>
1	100-120 ml/kg <i>Continue trophic feeds or start FAT</i>	CUSTOM	Adv by 0.5-1 <i>*Hold adv if Phos < 4 and/or BG > 150</i>	3-3.5	Start at 0.5 g/kg/day Adv by: 0.5- g/kg/day	Ca:Phos ratio (0.8-1 molar) Phos: 1-1.6 mmol/kg K: 1 mEq/kg (prefer K, if +UOP) Na: 0-1 mEq/kg	POCT Chem 8
2	120-140 ml/kg <i>trophic feeds</i>	CUSTOM	Same as above	3.5-4	1	Same	BMP, Mg, TG, iCal
3	120-140 ml/kg <i>trophic feeds</i>	CUSTOM	Same as above	3.5-4	1.5	Same or Liberalize Na/K	POCT Chem 8
4	140-150 ml/kg	CUSTOM	Same as above	4	2	Ca:Phos 0.8:1 Liberalize Na/K if indicated	BMP, Phos, TG if on 2gm IL
5	150-160 ml/kg	CUSTOM	Max of 10-12 if BGs < 150	4	2.5	Ca:Phos 0.8:1 Liberalize Na/K if indicated	POCT Chem 8
6	150-160 ml/kg	CUSTOM	Max of 10-12 if BGs < 150	4	3	Ca:Phos 0.8:1 Liberalize Na/K if indicated	POCT Chem 8, TG if on 3gm IL
7	150-165 ml/kg	CUSTOM	GIR↓ as feeds ↑	3.8-4	3	Ca:Phos 1:1 molar if Phos > 5; otherwise 0.8:1	POCT Chem 8, Phos
8	150-165 ml/kg	CUSTOM	GIR↓ as feeds ↑	2.8-3	↓ lipids** as feeds ↑	Same	POCT Chem 8
9	150-170 ml/kg	CUSTOM	GIR↓ as feeds ↑	1.5-1.8	↓ lipids** as feeds ↑	Same	POCT Chem 8 or BMP PRN
10	150-170 ml/kg	SPN D10% @ 20-30 ml/kg	GIR 2.5-4 as nearly full feeds	0.8-1.5	OFF	Consider custom PN if high Na/OAC requirement or enteral Na	Order BMP & Phos, for 5-7 days OFF PN

** If IUGR/SGA: add Phos within 24-48 hrs; add Magnesium if IUGR/SGA and NO maternal Magnesium.*

***As feeds increase, total fat intake as combo of IL + feeds acceptable up to 5.5 g/kg/day short-term.*

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Monitoring I-Calcium: (SLHS lab normal: 1-1.2)

- Low: < 0.9-1
- Normal: 1-1.2
- Elevated: iCa 1.45-1.6 mmol/L
 - Hypercalcemic neonates don't show symptoms; concern for peripheral or CNS calcification due to impaired ability for excretion.

Intervention:

Start Phos infusion within 24 hours of life to prevent altered mineral homeostasis, i.e. hypercalcemia; provide 0.8:1 molar ratio Ca:Phos within PN – first week or iCa \geq 1.4-1.7.

If severe (iCa > 1.7-1.8 mmol/L), STOP all PN Ca, recheck in 12-24 hrs.

Due to high AA intake & placental incompletely restored feeding syndrome, Phos is necessary for energy metabolism. Dose Phos intake based on Na/K salts available. If adequate UOP, select K-ion as preferred Phos source. Dose Calcium based on Phos ordered. Use these tables to find the amount of Calcium to provide within PN.

Table 1:

0.8:1 Ca:Phos molar ratio

*no changes for first 1-2 weeks; once Phos > 5 (x 2), may adjust to “normal” ratio – refer to next table.

If PN Phos intake	Provide Calcium intake
Phos (mMol/kg)	Ca (mEq/kg)
1	1.6
1.1	1.7
1.2	1.9
1.3	2.1
1.4	2.2
1.5	2.4
1.6	2.5
1.8	2.9
2	3.2

Table 2:

1:1 – 1.2:1 Ca:Phos molar ratio

For use AFTER week 1, AND once Ca/Phos normalize → Phos > 5 (x 2 values); i-Ca 1-1.2.

*This is the typical ratio goal to meet needs for preterm bone mineralization, once infant is in growth phase. Also ok for use with prolonged PN, restart of PN after period of EN only, while in growth phase.

If PN Phos intake	Provide Calcium intake
Phos (mMol/kg)	Ca (mEq/kg)
1	2-2.4
1.1	2.2-2.6
1.2	2.4-2.8
1.3	2.6-3.1
1.4	2.8-3.3
1.5	3-3.6
1.6	3.2-3.8 (goal)
1.8	3.6-3.8 (goal)