ICN "Nutrition Numbers"

UCSF Benioff Children's Hospital San Francisco

STARTER TPN

Goal: Initiate **< 2 hours** after delivery to limit the time until the infant is receiving protein and start lipids in the first 24 hours of life.

1. Target infants are <1500 grams or <32 weeks
2. 250 ml bags of D10AA4, 1.5 mEq Ca/100 ml and 0.5 units heparin/ml
3. The admitting MD/NNP orders "starter" TPN as one of the IVF, specified as D10AA4 at ___ ml/hour (80 ml/kg=8 g CHO/kg, 3.2 g protein/kg, 1.2 mEq Ca/kg)
4. Adjust rate per fluid need. Max "starter" TPN amount is 100 ml/kg/day. Order gap lipids at 1 g fat/kg/day if baby arrives between 1300-0700. Use order titled *"fat emulsion (INTRAlipid) 20% for after hours in preterm infants < 24 hours of age"* NOT the TPN/lipid order panel.
5. The admitting MD/NNP will also write the TPN order for the next delivery, advancing as per ICN guidelines and a corresponding order to discontinue the "starter" TPN solution once the new TPN hangs at 2100.
6. Do NOT give simultaneous IV Ca gluconate pushes in same line.

TPN SPLITTER	Device to allow 1 bag of TPN to infuse into 2 lumens; ↓'s extra fluid	Order: TPN to be infused using bifurcated tubing. Infuse 0.5 ml/hr via primary lumen and remainder by secondary lumen. Total infusion is: *** ml/hr.

TPN (*see Neonatal and Pediatric TPN card)*

	Unit	Initiate	Advance per day	Goal Preterm/(term)	Achieve by DOL
Fluid	ml/kg/day	60-80	prn	100 -140	N/A
Fat	g/kg/day	1	1	3	3-4
↑daily except Fi02>60% or >75% exchange level Hold lipids with PPHN/MAS/CDH/ECMO; consider 1 g fat/kg/day on DOL#7		**INTRAlipid 20%: standard; 2 kcal/ml; 1 g fat/kg=5 ml/kg** **SMOF/Omegaven criteria:** D bili >2 and AND PN planned for > 2 more weeks AND PN dependent for >50% caloric requirements NOTE: max dose of SMOF is 2.5 g/kg/day and Omegaven is 1 g fat/kg/day; Omegaven is a 10% emulsion or 1.1 kcal/ml; may need 0.5 g IL/kg/day for growth and EFA needs			
CHO	g/kg/day	6-11	1.5-3	14.5-17.3	5 - 7
Insulin		*see guidelines on WIKI			
Protein*	g/kg/day	3.5-4	1	3.5-4/(3)	2 - 4
Trophamine or equivalent		*may start at goal if line/fluid allow			
Na	mEq/kg/day	1	*Review all sources	3-5*	N/A
K	mEq/kg/day	1**	**Evaluate serum K+, renal fxn, hemolysis	2-3	N/A
Ca	mEq/kg/day	1-2‡	0.5-1‡	3.6-3.8/(2-2.5)	5 - 7
P	mmol/kg/day	0.5	0.3 - 0.5	1.8-1.9/(1-1.2)	3 - 5
PPN Guidelines: -Max 12.5% dextrose -May not exceed 1000mOsm/kg -Max Ca allowed 1 mEq/100 ml		• Advance as long as *i*Ca<1.45‡ • To treat high *i*Ca, increase the P • Serum P goal: 5- 8 mg/dl • Goal Ca (mEq):P (mmol) ratio is 2 to 2.4 : 1			
Mg	mEq/kg/day	Add once serum level <2.5 mg/dl Serum goal 2 - 2.5 mg/dl			N/A
Choride Acetate	mEq/kg	• preterm infants typically start with "max acetate" • must be reviewed daily and adjusted per labs • actual amount based on electrolytes and amino acids in solution			
Additives	MVI	2 ml/kg up to 5 ml/day			
	Preterm	1st 2 weeks: Zn: 400 Cu: 20 Se: 2 (mcg/kg/day)			
	Term:	1st 2 weeks: Zn: 250 Cu: 20 Se: 2 (mcg/kg/day)			
	Cholestasis	NO change; will monitor copper level			
Carnitine	10 mg/kg/day	NPO X 2-4 weeks or trig >150 mg/dl			
Cysteine	40 mg/g protein	Add on day 3 for all preterm infants <35 weeks w/o significant acidosis; may need more acetate			
Iron	0.1-0.2 mg/kg/day	Consider starting IV iron dextran if baby unable to tolerate feeds/enteral source of iron > 1 month			
Hypothermia Tx: ~80 ml/kg; adjust fluid per clinical status		8-**11.5** g CHO/kg/day, 1.5 g prot/kg, 1 g fat/kg, **advance to term goals when rewarmed**			

Weaning TPN

Feeding Volume (ml/kg) and conc	TPN vs PPN and substrate goals (CHO/ protein/fat)[1,3]		Ca/P (mEq/ mmol)	IV+PO Volume (ml/kg/d)	Total TPN Volume (ml/kg/d)[2]
0-59 (20 kcal/oz)	TPN	17/3.5/3	3.8/1.9	100-140	100-140
	PPN	11.8-15.6/3.5/3	1-1.4/1		
60-79 (24 kcal/oz)	TPN	14/2/2	3/1.5	120-140	60-80
	PPN	6.8-8.75/2-2.3/2	0.6-0.8/0.5		
80-99 (24 kcal/oz)	TPN	11.5/1.5/1	2.5/1.2	130-160	60-80
	PPN	6.8-8.75/1.5-2/1	0.6-0.8/0.5		
100-120 (24 kcal/oz)	TPN	8.5/1/0	2/1	130-160	40-60
	PPN	5-5.6/1/0	0.4-0.5/0.3		
>120 (24 kcal/oz)	D/CTPN; D/C central line				
NOTES:	1. g CHO/kg/d, g protein/kg/d, g fat/kg/d 2. Total TPN Volume = (total fluid goal)-(lower end of feeding vol range) 3. Adjust substrate goals for line allowances				

Monitoring:

Nutrition	Infant	Frequency	Lab Test
Parenteral	All	Mon/Thurs	Pediatric TPN panel, glucose
Enteral	Preterm	Mon or Thurs Q 2 wks if stable	Na+, K+, BUN, Ca, P, alk phos, Hct; 'lytes w/ diuretics glucose prior to feeds (2-4X/day)
		Mon or Thurs Q 2-4 wks after iron started	Hct, ferritin and ZnPP
	Term	1-2 weeks	'lytes with diuretic tx, Hct
		Q 2 wks if IV iron	Hct, ferritin and ZnPP

REDWOOD/GROVE: Maria Hetherton RD, CSP, CSPCC
PACIFIC/WBN/BRIDGE 2: Shannon Burke, RD, CSP
BRIDGE 1: use Voalte for RD coverage

Guidelines for Feeding* *(start oral care within 12 hours; feeds within 12-24 hours if able)*					
Birth GA (wks)	**1st day**	**Advance**	**Amount (ml/kg/d)**	**Once >60 ml/kg/day advance by**	**Achieve goal feeds**
<26	15 ml/kg/day	on day #5	15	20	Day#12
26 to 27-6/7	15 ml/kg/day	on day #3	15	20	Day#10
28 to 29-6/7	15 ml/kg/day	Daily	15	20	Day#9
30 to 31-6/7	20 ml/kg/day	Daily	20	30	Day #6
32 to 34-6/7	30 ml/kg/day	Daily	30	30	Day#5
>35	50 ml/kg/day or ad lib	Daily	50 or ad lib	50 or ad lib	Day#3
Risk Factors	Cord gas/1st gas pH <7 OR base deficit >15; chest compressions/ pressors; IUGR <3%ile, mono twins			**Decrease 1 GA step**	
Interval	15 ml/kg/day: q 4-6 hours 20+ ml/kg/day: q 2-3 hours		***Round***	≤2.5ml: nearest 0.5 ml >2.5 ml: nearest 1 ml	
Feeding	Preterm: DBM/MBM/SSC 20 Term: MBM/Similac 19		***↑ to 24 kcal/oz on same day as ↑ to 60 ml/kg/d (preterm)***		
Goal	Preterm: 150 -160 ml/kg/d MBM 24/SSC 24HP Term: 150 - 165 ml/kg/day MBM/Similac 20 MAXIMUM VOLUME: 175 ml/kg/day if via tube				
Notes	1. Baby should receive >60% of ordered volume before feeds ↑ 2. Central line out at 120 ml/kg/day feeds 3. Minimum of 3 days between volume/conc.↑ for weight gain 4. May need extended/continuous feeds if hypoglycemic between feeds 5. Change to **standard preterm HMF** when bottle attempted				

**** do NOT apply for babies with a GI surgical condition, s/p prolonged period (>=7d) NPO or risk of ↓ intestinal blood flow; feeding advancement will be determined on rounds.***

Specials	**Indication**	**Notes**
Donor Breast milk	All newborns eligible for specified duration: <28 weeks: up to 2 weeks full feeds; 28-32 weeks: up to 1 week full feeds; >32 weeks: 3 days full feeds; 3 day transition to formula by 25% increments (.icndonormilktransition)	Verbal parental assent as soon as possible
27 kcal/oz	Preterm infants should receive 24 kcal/oz feedings for 1 week before ↑ in conc. Consider hind milk.	Order preterm MBM 27
>3 kg	RD to evaluate appropriate use of preterm products to prevent excess nutrient intake	Individualized by patient
Neosure 22/24 MBM 24	Preterm infant preparing for discharge; individualized plan based on BW, growth and breast milk supply; discuss with RD and family 1 week prior to anticipated D/C	See WIKI for guidelines

Feeding Intolerance	
Signs	↑volume, dark bile or blood stained emesis or back up in feeding tube; abd. distension, discoloration or tenderness; visible bowel loops; bloody stool; abnl KUB; metab. acidosis or ↓plts; apnea (new onset/↑ frequency or severity), resp. distress, lethargy, poor perfusion, temp instability, etc
Evaluation	RN check a gastric residual if signs of intolerance; physical exam, KUB, CBC, blood culture, etc.
Recs	check fdg tube placement; prone position, right side down; ? glycerin if no stool X18-24 hours; if recurrent episode s/p fdg ↑, return to tolerated fdg vol. or conc.

Feeding After NEC (discuss with Pediatric Surgery prn)	
Initial Feed	NEC dx before or during trophic: 15 ml/kg NEC dx >30 ml/kg/day: 20 ml/kg
Advance	NEC dx before or during trophic: per BW GA guidelines NEC dx >30 ml/kg/day: 20 ml/kg
Feeding Type	MBM or DBM
Fortification	@ 60 ml/kg/day; 24 kcal/oz (do not delay)
Tolerance	Standard criteria; NPO or hold advance prn

Scale/ Score	**IDF: Feeding Readiness Scale (START AT 32 WKS)**	**IDF: Quality Score**
1	Alert or fussy prior to care. Rooting and/or hands to mouth. Good tone.	Nipples with a strong coordinated SSB throughout feed.
2	Alert once handled. Some rooting or takes pacifier. Adequate tone.	Nipples with a strong coordinated SSB but fatigues with progression
3	Briefly alert with care. No hunger behaviors. No change in tone.	Difficulty coordinating SSB despite consistent suck
4	Sleeping throughout care. No hunger cues. No change in tone.	Nipples with a weak/inconsistent SSB. Little to no rhythm.
5	Significant change in HR, RR, 02, or WOB outside safe parameters.	Unable to coordinate SSB; change in HR, RR, O2, WOB; unsafe swallow during fdg

Score	**IDF: Breast feeding supplementation (PROTECTED TIME x 3-5 DAYS)**
1-5	0-5 minutes. Gavage all
1-3	5-10 minutes. Gavage 2/3
1-3	10-15 minutes. Gavage 1/3
1-3	>15 minutes. No Gavage

Vitamin Supplementation (*see separate iron guidelines)		
Infant	Feeding Type	Supplement (per day)
Preterm (<1500 g)	D/MBM 24	400 IU vitamin D, NaCl prn
	SSC 24 HP	1 ml MVI, NaCl prn
Preterm (>1500-2500 g)	D/MBM 24	200 IU vitamin D, NaCl prn (≤ 2 unsupp BF) 1 ml MVI, NaCl prn (> 2 unsupp BF)
	SSC 24 HP	200 IU vitamin D, NaCl prn
Preterm (> 3kg)	MBM 24/BF	MVI
	Neosure 22/24	400 IU vitamin D
Term	BF/formula	400 IU vitamin D