

## East Bay Newborn Specialists Feeding Protocol for Enteral and Parenteral Nutrition

Revised: 7/2019

### TARGET POPULATION:

- Main focus for very low birth weight infants  $\leq 1500$  gm or preterm infants  $\leq 32$  weeks
- Guidance also provided for all preterm infants  $<34$  weeks GA or  $< 2000$  gm

### BACKGROUND:

Early initiation of enteral nutrition is advocated as a supplement to parenteral nutrition in the ICN. The advantages of early enteral feeds in this patient population include: improved trophic changes in the intestine, immunologic protection of the host, shorter time to reach full enteral feeds, less central line dwell time, decreased time under phototherapy, lower incidence of cholestasis, less feeding intolerance, with no increased incidence of NEC and improved neurodevelopmental outcomes.

### RELATIVE CONTRAINDICATIONS TO ENTERAL FEEDS:

- Birth depression/asphyxia
- Hemodynamic instability, pressors at high doses
- Severe and persistent acidosis
- Abdominal compromise
- Severe respiratory failure/cyanosis
- Severe anemia at birth
- Congenital anomaly- ie. Gastroschisis/omphalocele

### ADDITIONAL ENTERAL NUTRITION CAVEATS/CONSIDERATIONS:

- **Anemia:**
  - Consider at least weekly H/H monitoring for infants who remain on respiratory support, or who require frequent (daily or more) labs draws
- **PDAs:**
  - For ELBW infants, consider echos within the first month of life
  - If a PDA is hemodynamically significant (moderate or large, reversal of flow in the aorta, ventricular dilation, etc), follow at least weekly
- **Pressors:**
  - Consider holding any enteral feeding until blood pressures are stable off of pressor support for at least 12-24 hours
- **Acidosis:**
  - If significant metabolic acidosis, consider also checking lactate and holding any enteral feeds until pH improves and lactate had normalized
- **PRBC Transfusions:**
  - Continue to hold feeds for all infants while giving PRBC transfusion, which will run over 3 hours. If infant is well and tolerating enteral feeds prior to transfusion, consider re-starting feeds within 0-3 hours after completion of transfusion. Re-

start where feeds were prior to transfusion (ie: same volume/fortification). Ideally, infant will miss only one feed, therefore will not need fluids. Our new PRBC preparation now has a dextrose component, so concern for hypoglycemia is minimized and does not warrant routine blood glucose monitoring or additional IVs for routine infusions during the transfusion. As always, clinical judgment should be utilized in children with borderline glucose levels in the pre-transfusion period.

- **Prophylactic Indomethacin (please also see separate EBNS protocol):**
  - Please review maternal medication timing prior to delivery, especially for indomethacin. Consider holding prophylactic indomethacin in cases where the mother received doses within a few hours of delivery
  - If the infant is otherwise medically appropriate to receive enteral feeds, may start trophics while giving prophylactic indomethacin and it is reasonable to advance feeds while on indomethacin prophylaxis.
  
- **Indomethacin Treatment:**
  - If otherwise hemodynamically stable, should receive trophic feeds at minimum. Limited data to support decisions to reduce, hold, or advance feeds while treating with Indomethacin, but may be reasonable to maintain currently tolerated feeding volume. If feeds decreased during treatment, should advance back to previously tolerated feeding volumes and fortification in the next 1-2 days, rather than resuming feeding guideline from the point of trophic feeds.

**ENTERAL FEEDING PROTOCOL:**

- For infants < 34 weeks gestational age and < 2 kg birth weight
- Order oral colostrum care and trophic feeds on admission, unless contraindicated
- Begin **breast milk** enteral feeds by 48 HOL. Use donor breast milk for infants <1500gm OR < 32 weeks gestational age if no maternal breast milk available by 48 hours of life, or sooner if consent is obtained
- Fortify directly to 24 kcal/ounce using Similac HMF at a volume of 70-80 ml/kg/day

ENTERAL FEEDING TROPIC AND ADVANCE TABLE					
Infants with Birth Weight ≤ 1250 gm					
Birth Weight	Trophics, <b>5 DAYS (40 feeds)</b> (10-25 ml/kg/day)	Advance Volume (15-25 ml/kg/day)	Volume to fortify to 24 kcal/ounce	DAYS to reach 110- 120 ml/kg/day	DAYS to reach 150-160 ml/kg/day
350-500 gm	1 ml Q3hrs	Advance by 1 ml Q24hrs	4 ml/feed	11	13
501-600 gm	1 ml Q3hrs	Advance by 1 ml Q24hrs	5 ml/feed	12	14
601-800 gm	2 ml Q3hrs	Advance by 1 ml Q12hrs	7 ml/feed	10	12
Birth Weight	Trophics, <b>3 DAYS (24 feeds)</b> (10-25 ml/kg/day)	Advance Volume (15-25 ml/kg/day)	Volume to fortify to 24 kcal/ounce	DAYS to reach 110- 120 ml/kg/day	DAYS to reach 150-160 ml/kg/day
801-950 gm	2 ml Q3hrs	Advance by 1 ml Q12hrs	8 ml/feed	8	10

951-1100 gm	3 ml Q3hrs	Advance by 1 ml Q12hrs	10 ml/feed	8	11
1101-1250 gm	3 ml Q3hrs	Advance by 3 ml Q24hrs	12 ml/feed	8	10
<b>Infants with Birth Weight &gt;1250 gm</b>					
<b>Birth Weight</b>	<b>Trophics, 1 DAY (8 feeds) (15-25 ml/kg/day)</b>	<b>Advance Volume (30-35 ml/kg/day)</b>	<b>Volume to fortify to 24 kcal/ounce</b>	<b>DAYS to reach 110- 120 ml/kg/day</b>	<b>DAYS to reach 150-160 ml/kg/day</b>
1251-1500gm	3 ml Q3hrs	Advance by 2 ml Q12hrs	13 ml/feed	5	7
1501-1750gm	4 ml Q3hrs	Advance by 3 ml Q12hrs	16 ml/feed	4	6
1751-2000gm	5 ml Q3hrs	Advance by 4 ml Q12hrs	17 ml/feed	4	6

## **PARENTERAL NUTRITION (PN) GUIDELINES:**

### **CENTRAL LINE USE:**

- Place UVC/PICC for all infants  $\leq 1250\text{gm}$ , provider discretion for BW 1251-1500gm

### **PARENTERAL NUTRITION USE:**

- Begin PN for all infants  $< 1500\text{gm}$  or  $< 32$  weeks GA. Provider discretion for  $< 35$  weeks GA
- Begin protein within 2 hours of life, begin lipids within 12-24 hours of life
- Advance IL by 1 gm/kg/day
- Check triglycerides the morning AFTER starting 2 gm/kg/day and 3 gm/kg/day
  - STOP lipids for  $\text{TG} > 250$ , decrease for 200-250
  - Make sure carnitine is added to PN
- Decrease lipids to 2 gm/kg/day when enteral feeds are at 80 ml/kg/day and 24 kcal/ounce. Continue at 2 gm/kg/day until PN is discontinued
- Stop PN when enteral feeds at 110-120ml/kg/day

Cholestasis Prevention (direct bili 2 or greater):

GIR  $< 13$

Consider IL no greater than 2.5g/kg/day

Decrease trace elements, decrease IL vs using SMOF vs Omegavan

BCHO decrease Trace Elements (TE) by 50-70%

### **NUTRITION GOALS:**

- Calories:
  - PN: 90-110 kcal/kg/day
  - EN+PN: 100-120 kcal/kg/day
  - EN: 110-130 kcal/kg/day
- Protein:
  - 3.5-4.5 g/kg/day
- Fat:
  - 2.5-3 g/kg/day
- GIR:
  - $< 12$  mg/kg/min
  - Goal blood glucose 80-120
- Ca:Phos:
  - 1.3-1.7:1, molar ratio 1-1.3:1

**PARENTERAL NUTRITION GOALS AND WEANING GUIDELINES**

ADVANCING ENTERAL NUTRITION				PARENTERAL NUTRITION GOALS			
Enteral Volume (ml/kg/d)	Fortification (kcal/ounce)	Protein (gm/kg/d)* *	EN Calories (kcal/kg/d)	PN+IL Volume (ml/kg/d)	Protein (gm/kg/d)	Lipids (gm/kg/d)	HA Calories (kcal/kg/d)
20	20	0.2-0.3	13	60-120	3.5-4	1-3	90-100
40	20	0.4-0.6	27	80-110	3.5-4	3	80-100
60	20	0.6-0.8	40	60-90	3-3.5	3	60-80
80	24	2-2.3	64	40-70	2-2.5	2	40-80
100	24	2.5-2.8	80	40-60	1.5-2	2	20-40
120	24	3-3.4	96	<b>OFF</b>	<b>OFF</b>	<b>OFF</b>	<b>OFF</b>
140	24	3.5-4	112				
160	24	4-4.5	128				

**\*\*protein ranges represent DBM (term) to EBM (preterm in first 4 weeks)**

**Add GIR ranges and calorie targets**

PARENTERAL NUTRITION LIMITS							
PN Volume (ml/kg/d)	PERIPHERAL Hyeralimentation				CENTRAL Hyeralimentation		
	Amino Acids	Protein (gm/kg/d)	Dextrose	Osms	Amino Acids	Protein (gm/kg/d)	Osms
40	3.5%	1.4	10%		5%		
60	3.5%	2.1	10%				
80	3.5%	2.8	10%				
100	3.5 %	3.5	10%				
120	3.5 %	4.2	10%				

Central limits osmolarity 2500 osm/L

Peripheral 900 osm/L

Cysteine: BCHO 40mg/gm amino acid

**ENTERAL FEEDING TROPHIC AND ADVANCE TABLE**

**Infants with Birth Weight ≤ 1250 gm**

<b>Birth Weight</b>	<b>Trophics, <u>5 DAYS (40 feeds)</u> (10-25 ml/kg/day)</b>	<b>Advance Volume (15-25 ml/kg/day)</b>	<b>Volume to fortify to 24 kcal/ounce</b>	<b>DAYS to reach 110-120 ml/kg/day</b>	<b>DAYS to reach 150-160 ml/kg/day</b>
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**Infants with Birth Weight >1250 gm**

<b>Birth Weight</b>	<b>Trophics, <u>1 DAY (8 feeds)</u> (15-25 ml/kg/day)</b>	<b>Advance Volume (30-35 ml/kg/day)</b>	<b>Volume to fortify to 24 kcal/ounce</b>	<b>DAYS to reach 110-120 ml/kg/day</b>	<b>DAYS to reach 150-160 ml/kg/day</b>
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**TABLES BELOW REFLECTS THE CALCULATIONS BY WEIGHT** – a few infants still “miss the mark” by a tiny bit

**GREEN:** slower,  $\leq 15$  ml/kg/day trophic or advance OR fortify  $> 90$  ml/kg/day

**RED:** faster,  $>25$  ml/kg/day for  $<1250$ gm trophic or advance OR fortify  $<70$  ml/kg/day

Actual BW (gm)	Actual trophic ml/kg/day	Actual advance ml/kg/day	Actual fortification ml/kg/day
350	23	23	90
400	20	20	80
450	18	18	71
500	16	16	<b>64</b>
510	16	16	78
550	<b>15</b>	<b>15</b>	73
600	<b>13</b>	<b>13</b>	<b>67</b>
610	<b>26</b>	<b>26</b>	<b>91</b>
650	24	24	86
660	24	24	85
700	23	23	80
750	21	21	75
800	20	20	70
810	20	20	80
850	19	19	75
900	18	18	71
950	17	17	<b>67</b>
960	25	17	83
1000	24	16	80
1050	23	<b>15</b>	76
1100	22	<b>15</b>	73
1150	21	21	83
1200	20	20	80
1250	19	19	77
1300	18	25	80
1350	18	24	77
1400	17	23	74
1450	17	22	71
1500	16	21	70
1550	21	31	83
1600	20	30	80
1650	19	29	78
1700	19	28	75
1750	23	27	73
1800	22	36	76
1850	22	35	74
1900	21	34	72
1950	20	33	70
2000	20	32	<b>68</b>