NICU FEEDING PROTOCOL
Neonatal Enteral Feeding Protocol

Summary: Premature infants (<32 Weeks of Gestation or <1.5kg) have an immature gastrointestinal system and are unable to feed by mouth until at least 32-34 weeks corrected gestational age. Parenteral nutrition (TPN) is needed while enteral feedings are advanced.

Aim: To improve feeding tolerance and growth (weight, length, and head circumference) in low-birth weight infants and reduce days of parenteral nutrition.

Goal: To provide a consistent, evidence-based approach to feeding the low-birth weight infant.

Introduction: Enteral feeds are advanced with the goal of optimizing nutrition, reducing need for TPN and central lines, to reduce line related infection/ Late onset sepsis. In turn to increase enteral feeds quickly and safely to avoid NEC, a diagnosis with high morbidity and mortality in preterm infants. Studies have shown benefits to implementing a standardized protocol to advance and fortify enteral feeds. These benefits include reducing days on TPN, reducing days with central lines, and reducing NEC.

Guideline Statement: To reduce the number of days on TPN and days with central line in preterm infants weighing 750-1500g, with steady advancement in enteral feeds while not increasing the rate of NEC.

Initiation of feed

1. Human milk is preferred for feedings (Colostrum should be used for early feedings
2. Do not automatically/routinely freeze colostrum (if not used within 24 hours, then freeze)
3. If infant is NPO, colostrum will be used for mouth care. Place a small amount (0.1- 1 ml q 6hrs) directly onto oral mucosa in buccal cavity for absorption by mucosa.

Trophic feedings:

Trophic feedings (also called “minimal” or “priming” enteral feedings), are beneficial for preterm low birth weight infants. Colostrum and human milk have unique properties that have not been duplicated. These include nutrients, enzymes, growth factors, hormones, immunologic, anti-infective and anti-inflammatory properties. Research studies have shown a decrease in NEC and late onset sepsis Advantages of trophic feedings reported in the scientific literature include

Decrease In	Increase In
• Indirect Bilirubinaemia • Cholestatic Jaundice • Metabolic Bone Disease • Length of time to reach full feed • TPN Usage	• Gastrin & enteric hormones • Concentration of enteric hormones • Feeding tolerance • Weight gain

- Trophic feedings will begin within 24-48 hours of birth if infant is stable.
- Colostrum should be used for first feedings Colostrum should be used in the order it was produced .even if fresh (more mature) milk is available. Colostrum is more easily absorbed/easily tolerated. Fresh mature milk should be used in combination with colostrum by day 4-5.(may add specific antibody to NICU pathogens).
- Infants < 1000g/ 28 weeks of gestation will receive trophic feeding 10 ml/kg/d
- Infants 28-32 weeks of gestation feeding can be initiated at 20ml/Kg/d
- Infants >32 weeks of gestation feeding can be initiated at 30ml/kg/d
- Treatment for PDA is not a contraindication on trophic feeding

Advancement of feedings: is based on the condition of the babies and gestational age. Aim is to reach full feeds at 180mls/kg/day

- Infants < 1000g/ 28 weeks of gestation feeds can be advanced by 10 ml/kg every 12 hours
- Infants 28-32 weeks of gestation (or 1000gm to 1499gm) feeds can be advanced by 15mls/kg every 12 hours
- Infants >32 weeks (>1500gm) of gestation feeding can be initiated at 30ml/kg/d-Feeds can be advanced by 15ml/kg 12hourly depending on the tolerance

Aspirates:

1.Aspirates are expected while on trophic feedings. Check for aspirates every 6-8th hourly.Yellow aspirates are not a contraindication for trophic feedings.

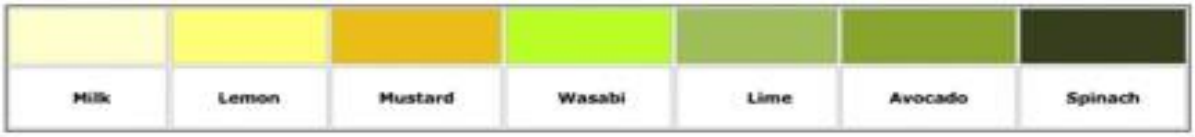
2.Undigested aspirates will be refed. Current feeding volume will be fed in addition to volume of aspirate. Partially digested milk is rich in enzymes needed for digestion and can be refed

3.Mucous or bloody aspirates will be discarded

4.If aspirate is<20% of feeding volume, continue advancement

If aspirate is 20-40% of feeding volume for 2 consecutive feedings, notify MD/NP. Continue feedings in the absence of clinical symptoms but hold advancement.

5.If Aspirates >40% then • Hold feedings • Obtain KUB (indication: Feeding Intolerance)



Continue	Continue	Continue	Continue	Review	Review	Discard

Indications for withholding feeding

1. Emesis in any infant<1500g more than 50% of the feed volume in 24hours
2. An abnormal physical exam consisting of the following:
   - Unstable vital signs
   - Abdominal distention (increase in abdominal circumference >2 cm)
   - Visible bowel loops
   - Bilious emesis
   - Visible blood in stool
3. Dark green residuals or change in colour (darkening) of residuals. (Light green residuals with a normal exam may not be a reason to hold feedings.)
4. Aspirates of 20-40% feeding volume for 2 consecutive feedings.

Choice of Milk

Expressed breast milk is the first and utmost choice for premature babies. In case of low milk output or no EBM available due to unforeseen reasons then the next available option is Donors Breast milk – Neolacta or Amara

Neolacta PHBM 70 is pasteurised human milk with the minimum guaranteed energy of 70 cals/100 ml. The product provides essential calories, fat and protein sourced from 100% Human Milk to meet the nutritional requirement of a baby. NeoLacta PHBM 70 can be used when mother's own milk is not available, or the baby needs extra calories for growth.

Fortification

- Colostrum will not be fortified.
- When we reach full-feeds fortification can be initiated with half and then full fortification
- If infant not tolerating fortification and not gaining adequately, consider 1 ½ fortification and hindmilk feedings.
- MMF- Mother's milk fortifier can be used in babies <30 weeks of gestation/ <1.2kg

- HMF- Human milk fortifier can be used in babies >34 weeks of gestation
- Multivitamins can be started after stopping the fortification as the fortifiers are quiet rich in micronutrients.

Human Milk fortifiers comparison

Fortification has to be done in breast milk in the proportion of 25ml breast milk : 1 sachet fortifier and can be made 25 ml breast milk : 1 ½ sachet fortifier to give 27kcal/ ounce.

Caution:

- Avoid mix up of two different fortifiers for a single fortification
- Two different fortifiers can be used in consecutive feeds to increase caloric density in older premature babies
- MMF is preferred for extreme premature babies and with a slow or immature gut as the fortifier is human milk-based fortifier
- HMF can be chosen for premature babies with good and mature gut and once feeds are well tolerated

Contents		**RDA**	**EBM**	**MMF for 100ml fortification**	**MMF plus for 100 ml**	**HMF advance for 100 ml**
Macronutrients						
Energy	(Kcal)	115-140	65	67	82.56	83
Protein	(g)	3.5-4.0	1.39	1.62	2.71	2.8
Total Carbohydrates	(g)	11-15	6.44	7.3	9.77	7.4
Total Sugar	(g)	-	0	0	2.21	0
Added Sugar	(g)	-	0	0	<0.004	0
Total Fat	(g)	4.8-8.1	3.78	3.5	3.65	4.5
Vitamins						
Vitamin A (Retinol)	(mcg)	1130-3330 (IU)	377.78 |(IU)	14.4	15.6	777.8 (IU)
Vitamin Bl (Thiamine)	(mg)	140-290 (mcg)	10 (mcg)	0.01	0.01	130 (mcg)
Vitamin B12 (Cyanocobalamin)	(mg)	NA	0.01	0 02	0.06	0

Vitamin B2 (Riboflavin)	(mg)	200-430 (mcg)	30 (mcg)	0.03	0. 04	50 (mcg)
Vitamin B3 (Niacin)	(mg)	1100-5700 (mcg)	210 (mcg)	0.21	0.39	410 (mcg)
Vitamin B5 (Pantothenic Acid)	(mg)	NA	0.1	0.23	0.36	0
Vitamin B6	(mcg)	45-300	14.28	0	0	54.3
Vitamin B7 (Biotin)	(mcg)	NA	0.6	0.54	7.88	5.4
Vitamin B9 (Folic Acid)	(mcg)	23-100	3.33	3.1	3.57	11.3
Vitamin C (Ascorbic Acid)	(mg)	NA	3.0	4.4	4.4	3.6
Vitamin D (Calciferol)	(mcg)	400-700 (IU/kg/day)	1.94 (IU/kg/day)	0 20	0.6	201.9 (IU/kg/day)
Vitamin E (Tocopherol)	(mg)	2.2-11	1.00	0.26	0.26	1.8
Vitamin K (PhyIloquinone)	(mcg)	4.4-28	2	2	2.4	6.0
Minerals						
Iron (Fe)	(mg)	0	0	0 09	43	0
Calcium (Ca)	(mg)	120-160	23.89	25	48.94	103.9
Phosphorus (P)	(mg)	60-90	12.22	14.5	19.96	52.2
Sodium (Na)	(mg)	NA	0	28	36.87	20 (mcg)
Potassium (K)	(mg)	NA	51	50	78.52	68.2
Chloride (as Cl)	(mg)	NA	0	0.06	22.24	20.5
Magnesium (Mg)	(mg)	7.2-9	3.3	3.3	5.84	6.3
Chromium (Cr)	(mcg)	NA	0	NS	0.44	0
Molybdenum (MO)	(mcg)	NA	0	NS	0.2	0
Selenium (Se)	(mcg)	NA	3.2	24	3.72	1.62
Copper (Cu)	(mcg)	NA	66.3	38	59.12	50.3
Manganese (Mn)	(mcg)	NA	0.3	0.36	1.52	0.75

Iodine (l)	(mcg)	NA	33	17.8	36.76	19.5
Zinc (Zn)	(mg)	2.0-3.0	0.33	0 37	0.57	1.9

References:

- Adamkin, D. H.. (2005). Pragmatic Approach to In-Hospital Nutrition in HighRisk Neonates.
- Journal of Perinatology (25), S7 – S11. Kleinman, R.E.,(2009).
- Pediatric Nutrition Handbook (6th edition). Nutritional needs of the pre-term infant. 79-112. Elk Grove Village, IL Lavoie, P.M.. (2009, February).
- Earlier Initiation of enteral nutrition is associated with lower risk of late-onset bacteremia only in the most mature very low birth weight infants.
- Journal of Perinatology, (29), 448 – 454. Meier, P. (2009). Advancing Enteral Feedings of Own Mothers Milk for ELBW Infants. Rush Mothers Milk Club. Mosqueda, E., Sapiegiene, L., Glynn, L., Wilson-Costello, D., Weiss, M.. (2008, January).
- The early use of minimal enteral nutrition in extremely low birth weight newborns. (28), 264-269. Quality Improvement Toolkit, CPQCC, (2008).
- Nutritional Support of the Very low Birth Weight Infant. Retrieved from www.cpqcc.org. Rodriquez, N.A., Meier, P.P., Groer, M. W., Zeller, J.M. (2009).
- Oropharyngeal administration of colostrum to extremely low birth weight infants: theoretical perspectives". Journal of Perinatology (29) 1-7. Spatz, D.L. and Edwards, T.M. (2009, September). The Use of Colostrum and Human Milk for Oral Care in the Neonatal Intensive Care Unit. NANN e-newsletter, (1), 4.
- Retrieved from www.nann.org/pubs/enews/sept_09.html

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