

 <p>NEONATAL CLINICAL PRACTICE GUIDELINE</p>	Title: Enteral Feeding and Nutrition for the Preterm and High Risk Neonate	
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	Approved by: Neonatal Patient Care Teams, HSC & SBH; Child Health Standards Committee; WRHA PAC	Supersedes: HSC # 80.210.440; SBH # 118; WRHA Enteral Nutrition for the Preterm and High Risk Neonate; WRHA Enteral Feeding for the Preterm and High Risk Neonate

1.0 PURPOSE AND INTENT

- 1.1. To provide a process for managing all enteral feeding and nutrition provided orally and via gavage for preterm and high risk infants in the neonatal intensive care unit.

Note: All recommendations are approximate guidelines only and practitioners must take in to account individual patient characteristics and situation. Concerns regarding appropriate treatment must be discussed with the attending neonatologist.

2.0 PRACTICE OUTCOME

- 2.1 To provide early, safe, and targeted nutrition to achieve goal growth, positive feeding skills, and to minimize risk among preterm and high risk infants.

3.0 DEFINITIONS

- 3.1 **Feeding intolerance:** A combination of clinical signs suggesting the inability to tolerate enteral nutrition. May include abdominal distension, discoloration, or visible bowel loops; new onset of frequent emesis or frank blood in stool.
- 3.2 **Milk/ Breast Milk:** Throughout the document the terms milk and breast milk are used to describe infant feeds. Whenever possible this will refer to the use mother's own fresh expressed breast milk (EBM). If no fresh or frozen EBM is available, donated breast milk (DBM) can be used with consent should the infant qualify. The term milk is inclusive of EBM or DMB feeds including fortification. The term also includes the use of formula should the other options be unavailable.

4.0 FEEDING GUIDELINES

- 4.1. Use only syringes and tubing that are specifically designed for enteral feeding and cannot be attached to any intravenous access location.
- 4.2. Whenever possible, infant feeding preparation should take place in the dedicated Infant Nutrition Preparation Room. If not possible, feeds should be prepared away from the bedside in the designated feeding preparation areas within the NICU using aseptic food safety handling techniques to prevent contamination, including:
- 4.2.1. Sanitize preparation surface with approved disinfectant and allow to dry.
 - 4.2.2. Perform hand hygiene for all feed preparations. Don clean gloves when preparing any feed containing breast milk.
 - 4.2.3. Perform hand hygiene prior to initiating any oral feed (gavage, while supporting breast feeding, or bottle feeding). Don clean gloves when exposure to body fluids is a risk (such as when administering feed containing breast milk).

- 4.2.4. Avoid touching any portion of the feeding system that will come into contact with milk.
- 4.2.5. For bolus bottle or gavage feeds, discard any unused feed that has been warmed after 2 hours.
- 4.2.6. Change feeding frequency to every 3 hours when an infant has demonstrated tolerance of full feedings and is above 1250 gram current weight.
- 4.2.7. Measure infant length and head circumference weekly and document on the appropriate gender-specific term or preterm growth chart in the health record according to post-menstrual age.
- 4.2.8. For infants who are on full enteral feeds and have achieved their birth weight, adjust volume of the feeds to new weights on Mondays and Thursdays.
- 4.2.9. Weigh infant twice weekly unless there are other medical indications to weigh the infant more often (e.g., extreme prematurity, fluid status, poor growth)

5.0 GAVAGE FEEDING

- 5.1. Consider the options for feeding tube placement according to infant assessment. They include: oral or nasal, indwelling or intermittent placement. Oral placement is preferred for infants who are not taking feeds by bottle or breast. Oral tubes are also recommended for infants who have increased work of breathing. Neonates are obligate nose breathers. The appropriate combination should be determined individually for each infant using the advantages and limitations outlined in Appendix A.
- 5.2. Change the nasogastric (NG) or orogastric (OG) Polyvinyl Chloride (PVC) tubes every 72 hours and as needed. Change silastic or polyethylene or polyurethane (PUR) feeding tubes every 30 days. Do not change transpyloric (naso-jejunal) tubes except by a physician or nurse specifically trained in their insertion.
- 5.3. Unless using freshly pumped milk, warm milk to the appropriate temperature using the commercial milk warmer according to manufacturer's instructions.
- 5.4. Measure and mark gastric tube before insertion to indicate appropriate insertion depth. Tube measurement is distance from tip of nose to tragus to mid-way between xiphoid sternum and umbilicus. See Appendix B.
- 5.5. Verify position of the gastric tube before each use (feeding or medication administration) by completing each of the following:
 - 5.5.1. Check the insertion marking and compare to that which was documented when the gastric tube was inserted.
 - 5.5.2. Gently aspirate 0.2-1mL of gastric contents, and using a pH test strip, verify that the pH is less than 5.5. Document the pH in the record.

Note: Auscultation of air insufflation through the tube is ineffective and misleading as both the esophagus and the respiratory tract will produce the same sounds in small infants.
- 5.6. Assess tolerance prior to each feed **without** routinely aspirating full gastric volume. Perform a complete clinical and physical examination when feeding intolerance is suspected before making a decision regarding interruption of feeding. See Appendix C.
 - 5.6.1. In cases when checking full gastric residual volume is indicated (see Appendix C), and if gastric residual is re-fed, do not count that volume in the feeding volume column unless otherwise specified by the medical team. If the volume of feeding is decreased, adjust IV fluids to meet total fluid intake requirements.
 - 5.6.2. If unable to aspirate any gastric residual in circumstances when checking full gastric residual is indicated or when attempting to obtain a small amount of gastric contents to verify tube

placement, follow the decision making flow chart (Appendix B).

5.7. Administer bolus feeds either by gravity or push. The infusion rate of a bolus feeding is no faster than **2 mL per minute for smaller feeding volumes for infants not yet on full feeds**. With larger volumes for infants on full feedings **the bolus feed takes approximately 15 minutes to complete**.

5.7.1. If using gravity feeding method, attach the feeding syringe to the feeding tube, with the plunger removed, and pour the milk into it. Hold the syringe just above the infant's head so the feed infuses slowly.

5.7.2. If using push feeding method, attach the syringe to the feeding tube and push slowly. Be mindful of the feeding rate mentioned above.

5.8. Encourage non-nutritive sucking during gavage feeds. The infant sucks on a soother or cotton tipped adaptor dipped in milk. Encourage kangaroo care during feeding. Refer to guideline: [Skin to Skin / Kangaroo Care in Neonatal Units](#).

5.9. During feeding, continuously observe the infant for any signs of respiratory distress, abdominal distension or reflux of milk. Pause feeding if they occur to allow the infant recovery time and to perform any appropriate interventions.

5.9.1. If the syringe is passed to a parent to hold, ensure you remain close by the infant to continue to monitor these signs.

6.0 **CONTINUOUS OR INTERMITTENT PUMP FEEDING**

6.1. To avoid increasing bacterial growth, administer the feed without pre-warming if running continuously.

6.2. Visually assess feeding tube position at least every hour. If there are changes in the patient's status, consider checking feeding tube placement more frequently. Check tube position and document the pH immediately prior to each feed or every four hours if continuous.

6.3. For pump feeding with syringe:

6.3.1. Use a new syringe for each feed.

6.3.2. Use tubing for up to 24 hours. Rinse the tubing with sterile water in between feeds if intermittent.

6.4. When using pump with bags (i.e. kangaroo pump):

6.4.1. Rinse bag and tubing with sterile water every 4 hours.

6.4.2. Replace all bags and tubing every 24 hours.

6.5. To prevent tubing misconnections (enteral feeding to intravenous site):

6.5.1. If possible, designate one pump for enteral feeds only and clearly label it that way (i.e., label "enteral feeding only"). Use another pump for other infusions/ medications.

6.5.2. Use tubing, syringes, or bags intended for enteral use only.

6.5.3. Clearly label syringe or bag with 2 patient identifiers and type of feeding contents, along with two signatures, if indicated.

7.0 **NUTRITION GUIDELINES**

7.1. Oral Immune Therapy (OIT) is the administration of mother's colostrum by placing small drops directly on the oral mucosa for absorption by the mucous membranes. Refer to guideline (St. Boniface Hospital): [Oral Immune Therapy \(OIT\)](#)

(OIT is especially beneficial for extremely low gestational age infants given the protective effects against development of nosocomial infections and necrotizing enterocolitis).

7.2. Give OIT using expressed breast milk within the first 6 hours of life for all infants <29 weeks and/or less than 1.25kg birthweight if the mother is expressing breast milk. If no EBM is expected, consider same with DBM.

7.2.1. Administer approximately 0.2mL or up to 14 drops of milk directly into the oral mucosa every 2 hours. Document in the clinical record.

7.2.2. Consider providing OIT for all infants who are not yet orally feeding by breast or bottle.

8.0 **INITIAL ENTERAL FEEDS**

8.1. Initiate enteral nutrition for all infants as soon as possible or within 6 hours of birth unless there are contraindications to feeding (i.e. known gastrointestinal anomaly or obstruction).

8.2. For infants with birthweight greater than 2.5 kg, determine nutrition based on assessment of infant's history, condition and tolerance of feeds. When infant is physiologically stable initiate feeds at 0.5-1.0mL/kg/hr.

8.3. For infants with birthweight less than 2.5 kg, proceed directly to the feeding schedules in Appendix D.

9.0 **MINIMAL ENTERAL FEEDS (MEF)**

9.1. Also known as "trophic feeds"; provides protective effects against development of nosocomial infections and necrotizing enterocolitis.

9.2. Always preferentially use mother's fresh expressed breast milk (EBM).

9.3. If no fresh or frozen EBM available, use donor breast milk (DBM); see clinical practice guideline: [Donor Human Milk and Human Milk Based Fortifier for Neonates](#).

9.4. If parents do not consent to DBM, initiate MEF with 0.81kcal/mL premature formula unless other option indicated by Dietitian or medical team.

9.5. Administer 1mL/kg every 2 hours calculated on infant's birthweight.

9.6. Continue for 24-72 hours, as indicated in Appendix D to promote postnatal gastrointestinal maturation, reduce mucosal atrophy, and stimulate growth of intestinal tract.

9.7. Include MEF volumes in the cumulative fluids total, but not in the total fluid intake as they are a "fluid gift". Continue to administer intravenous fluids at the full rate.

9.8. Continue MEF even if the following occur or are present:

9.8.1. Umbilical catheters.

9.8.2. Intrauterine growth restriction.

9.8.3. Inotropic or nitric oxide support

9.8.4. *In utero* reversal of end-diastolic flow.

9.8.5. Decreased bowel gas seen on an abdominal x-ray.

9.8.6. Treatment for Patent Ductus Arteriosus (PDA).

9.9. Discontinue or delay MEF if any of the following occur:

9.9.1. Receiving two or more inotropes.

- 9.9.2. Serum lactate of greater than or equal to 3 mmol/litre (after 24 hours of age).
- 9.9.3. Diagnosis of necrotizing enterocolitis (NEC) or spontaneous intestinal perforation (SIP).
- 9.9.4. Suspected or confirmed bowel obstruction.

Note: Unless NEC, SIP, or bowel obstruction confirmed, continue to assess at routine times and restart MEF as soon as possible. If unsure, follow feeding intolerance algorithm in Appendix B.

- 9.10. When reinstating MEF after an interruption, continue the remainder of the MEF protocol for total duration of 24-72 hours. Reassess clinical status and tolerance prior to increasing feeds per protocol in Appendix D.
- 9.11. Consider a course of MEF for infants who may not otherwise qualify but have suspected impaired mesenteric blood flow or after a prolonged period of absence of enteral feeding.

10.0 ADVANCING ENTERAL NUTRITION/ PROTOCOL FEEDS

- 10.1. Advance feeding volumes and frequencies according to the protocols in Appendix D. For infants greater than 2.5 kg, gradually increase by 10-30 mL/kg/day. Feed every 3 hours depending on individual assessment of the infant. For compromised or high risk infants, start feeds at 5 mL and increase 1-2 mL per feeding or as ordered by physician/ nurse practitioner/ dietitian.
- 10.2. When advancing enteral feeding volumes, decrease intravenous fluids as appropriate to meet daily fluid intake requirements (TFI).
- 10.3. Continue feeding plan, unless otherwise ordered by the medical team.
- 10.4. Initiate enteral feeds for infants with an umbilical arterial catheter, irrespective of where the line is placed (high or low).
- 10.5. Initiate enteral feeds for infants with an umbilical venous catheter only if the tip of the catheter is located above the diaphragm and the catheter has not been used for any type of exchange transfusion. If the tip of the catheter is located below the diaphragm or has been used for an exchange transfusion do not initiate enteral feeds unless otherwise specified in the care plan. Such cases will require an individualized approach.
- 10.6. Assess tolerance prior to each feed without routinely checking gastric residuals. If signs of feeding intolerance arise, please follow the feeding intolerance algorithm in Appendix B.
- 10.7. When writing NPO orders on the physician order sheet/EPR, include the reason, as well as patient assessment information in the integrated progress notes.

11.0 FORTIFICATION AND SUPPLEMENTATION

- 11.1. Initiate fortification of breast milk with nutritional additives when patient is tolerating >75 mL/kg/day enterally, as ordered by clinical dietitian/ physician/ nurse practitioner. Continue to increase fortification of milk every 24-48 hours, as tolerated until the infant reaches their goal estimated nutritional requirements, calculated by the clinical dietitian.
- 11.2. Supplement with needed vitamins and minerals once tolerating >75 mL/kg/ day enterally as outlined in Appendix E.
- 11.3. Assess iron stores and need for supplementation at 4-6 weeks of age for all infants born less than 35 weeks. Iron requirements for premature infants are 2-4 mg/kg/day. If the infant is iron deficient, or at high risk of iron deficiency based on clinical monitoring of serum ferritin, hemoglobin and reticulocytes, provide 4-6 mg/kg/day (from all sources). Continue to re-assess blood work every 2-4 weeks, or as clinically necessary until stable. See Appendix E.

12.0 SAFE INDIVIDUALIZED NIPPLE COMPETENCE (SINC)

- 12.1. Facilitate the first oral feed experience for the infant when the mother or caregiver can be present. Ideally, a first oral experience is to be at a pumped breast if the mother plans to breastfeed. If the mother does not plan to breastfeed, the mother or caregiver should provide a bottle with support from staff.
- 12.2. Implement the SINC protocol for infants born at less than 33 weeks gestation (see Appendix F). Assess infants once they no longer require invasive ventilation. Before beginning SINC level A assess for signs of readiness including:
 - 12.2.1. Physiologic stability with normal care.
 - 12.2.2. Ability to swallow and manage oral secretions.
 - 12.2.3. Display of hunger cues when gently approached.
- 12.3. SINC level A success is considered when the infant demonstrates physiologic stability with latching and brief non-nutritive sucking (NNS) bursts on a pumped breast (5 minutes) or dry soother (5 minutes). This is done as a standard for all infants.
- 12.4. SINC level B and C also called “therapeutic tasting”, consists of feeding at the breast (not pumped) for 10 minutes or drops of milk one at a time on a soother for 5 minutes. If at the breast, provide the full volume of the feed by gavage.
- 12.5. SINC level D progresses to 15 minutes at the breast or an open slow flow nipple.
 - 12.5.1. Determine if infant is demonstrating signs of feeding readiness prior to initiating SINC D. Initiate SINC D if infant is demonstrating signs as per level 1 or 2 as per Infant Driven Feeding Readiness Scale (See Appendix G).
 - 12.5.2. When using a nipple, keep the nipple half full. Do not progress past this stage if the infant is on non-invasive ventilation without further assessment.
- 12.6. Support the infant when bottle feeding:
 - 12.6.1. Provide postural stability on a pillow, side lying, bundled, hands midline.
 - 12.6.2. Promote oral organization with NNS prior to introduction of nipple.
 - 12.6.3. Use slow flow nipple.
- 12.7. SINC level E-K: continue to use slow flow nipple unless otherwise recommended by an Occupational Therapist. Assess competence each feed and success with potential to advance every 24 hours.
 - 12.7.1. When assessing feeding competence to progress to next stage, consider weight gain, respiratory status and cardiorespiratory events in addition to number of successful feeds.
- 12.8. Advance through the stages when the infant has successfully achieved the requirements of the stage in 9 of 12 or 6 of 8 feeding times in a 24 hour period. For stages B and higher this includes maximum volume within the maximum time frame. Note: the infant may stay at any stage for a prolonged period of time. If the infant is not eating successfully at their current stage keep them at that stage. Consider a consult to Occupational Therapy if the infant is repeatedly unable to advance.
 - 12.8.1. Note time when SINC level was changed when counting number of successful feeds.
- 12.9. If the infant shows any signs of decompensation, apnea, bradycardia or desaturation, disinterest or disengagement, immediately stop the oral feeding and complete the remainder of the feed by gavage, allowing the infant appropriate time to recover before proceeding to gavage.

12.10. Feed infants with only **2 modes** at any feeding time (i.e., breast/gavage; bottle/gavage; or breast/bottle). Encourage breastfeeding as often as possible, as early and frequent exposure lead to long term success.

12.11. When breastfeeding, assume the max volume for the stage based on assessment of milk transfer and mother's report of the infant's latch and suck. Consider test weights before and after feeds when infant has advanced to the later stage. Alternatively, estimates for feed volume can be approximated based on mother's regular pumped volumes minus the remaining milk pumped post current feed. Work closely with the mother to make a plan that supports breastfeeding skill development and mother's own confidence.

13.0 **SEMI-DEMAND/ CUE BASED AND AD LIB DEMAND FEEDING**

13.1. Transition from SINC feeding to a semi-demand/cue based (See algorithm in Appendix H) when infant (born less than 33 weeks) is successfully taking approximately 85% of feeding volume at 6 feedings per day. For infants born at 33 weeks or later, who are fed by gavage, transition directly to semi-demand/ cue based feeds when they show oral feeding readiness. For signs of feeding readiness and disengagement see Appendix I.

13.2. Transition to ad lib demand (as much volume as they wish as often as they wish with no volume limit) if infant is:

13.2.1. Gaining weight at a minimum of 15gm/kg/day, and

13.2.2. Orally feeding (breast or bottle) full requirements without difficulty including no events with feeds for 24 hours at either every 3 hour or every 4 hour frequency, and

13.2.3. Tolerating all feeds for at least 48 hours.

13.3. Assess feed volume every 8-12 hours. Minimum acceptable fluid volume for feeding is based on a physician's fluid order. If volumes are inadequate, reestablish scheduled feeding times.

13.4. Infants who are late-preterm or who do not wake on their own to demand feed are fed ad lib volumes on an every 3 hour schedule. They may be discharged on this feeding regimen if they have met all other discharge criteria. Provide parents with appropriate education materials and contact information for the Breastfeeding Service (if breastfeeding).

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Appendix A

Decision Making for Feeding Tube Location and Placement Duration

	Nasal	Oral	Indwelling	Intermittent
Advantages	Does not interfere with breast or bottle feeds	Less traumatic insertion Less impact on respiration	Less frequent trauma / distress from insertion especially if infant has active gag or vagal reflex	Allows infant who is learning to feed to have no obstructions or irritants during oral feeding Infant looks more "normal" when tube not in place
Limitations	May interfere with respiration Cannot be used if infant has any nasal ventilation, CPAP or oxygen delivery May contribute to tracking of organisms into upper respiratory system and sinuses	May interfere with oral breast or bottle feeding Easier for infant to dislodge May contribute to oral aversion	May be a constant irritation to infant.	More frequent insertions may increase risk of trauma, oral aversion

Nasal or Orogastric tube measurement: the distance from the bridge of the nose to the earlobe and from the earlobe to a point halfway between the xyphoid process and the umbilicus.

Appendix B

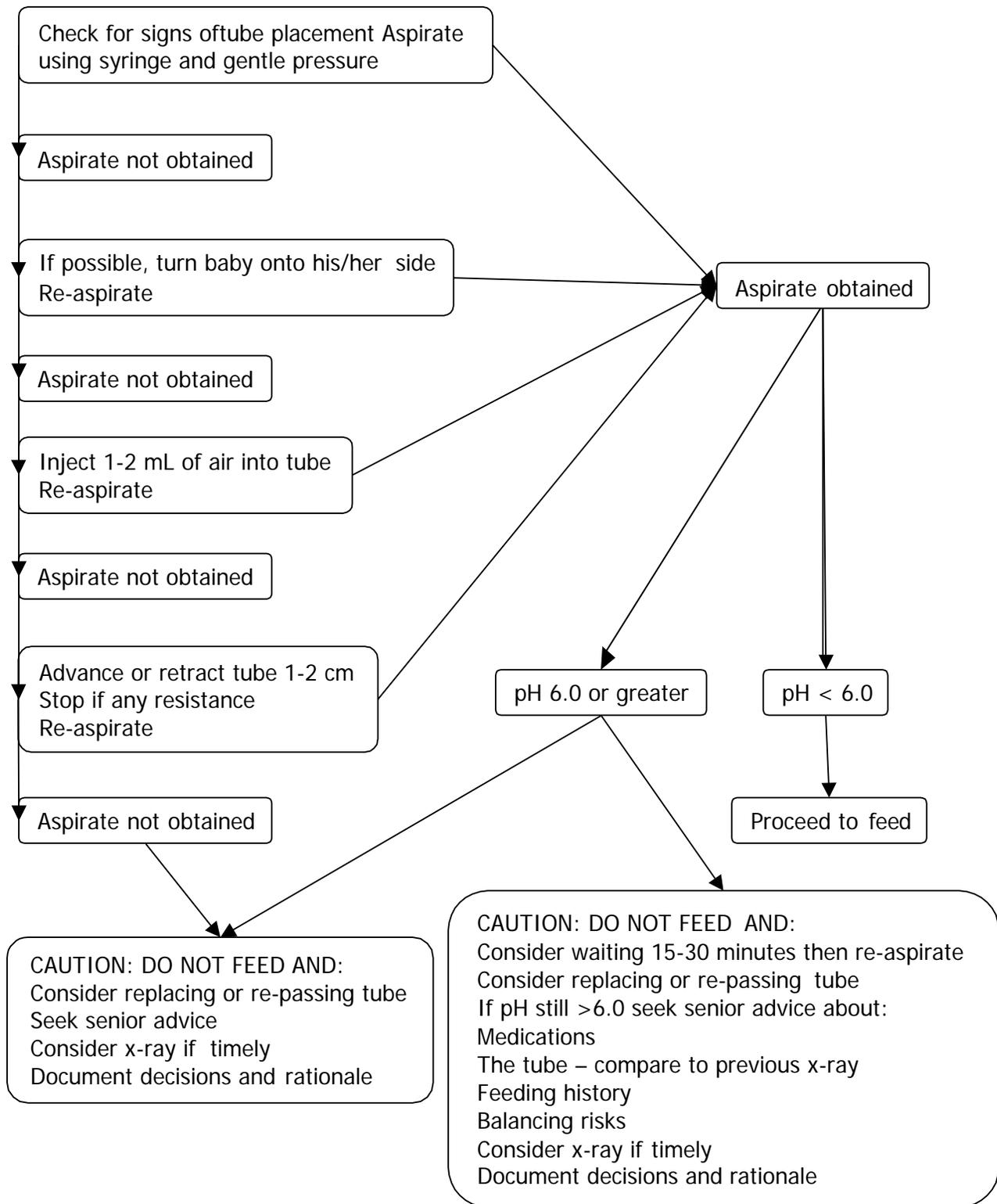
Decision Making for Gastric Tube Placement Verification

Action	Rationale
Check for signs of tube displacement (if not initial insertion)	The tube may have coiled up in the mouth or if there is more tube visible than previously documented, the tube may have kinked. Loose tape may indicate movement. If tube has been displaced, it will need repositioning or re-passing before feeding.
Aspirate 0.2–1ml gastric fluid and apply to pH testing paper. Allow 10 to 15 seconds for any colour change	0.2 to 1ml of aspirate will cover an adequate area on single, double or triple reagent panels of pH testing paper. <i>Note: extreme preterm infants may not produce enough gastric secretions to test. If that is the case see the last row below titled "If you still cannot obtain aspirate".</i>
Aspirate is pH 5.5 or below PROCEED TO FEED	Aspirates testing pH 5.5 and below should indicate correct placement in most babies (including the majority of those receiving acid suppressants) and rule out the possibility of respiratory tract placement. If there is ANY doubt about the position and/or clarity of the colour change on the pH indicator strip or paper, particularly between pH5 and 6, DO NOT commence feeding.
Aspirate is pH 6 or above <ul style="list-style-type: none"> Consider replacing and/or re-passing the tube and re-aspirating. If clinically safe, consider waiting 15–30 minutes before aspirating again. If still pH 6 or above, seek advice from the Clinical Resource Nurse or charge nurse. 	The most likely reason for failure to obtain gastric aspirate pH 5.5 or below is the dilution of gastric acid by enteral feed. Waiting gives time for the stomach to empty and the pH value to fall. If pH is still 6 and above after waiting and replacing or re-passing the tube, seek advice and consider the following questions: <ul style="list-style-type: none"> Is the baby on medication? Is the baby only 24 to 48 hours old? Is the tube in the correct position? Is the visible length of the tube the same as previously documented? What is the trend in pH values? What is the volume of aspirate? Clinical staff should balance the risks of not feeding a baby, in the short term, with feeding when there is the possibility of the tube being in the lungs. Only consider x-ray if timely, e.g. if the baby is due for an x-ray for other reasons, and/or it is clinically safe to do so.
Problems obtaining aspirate: Turn baby onto his/her side	This may facilitate the tip of the gastric tube entering the gastric fluid pool.

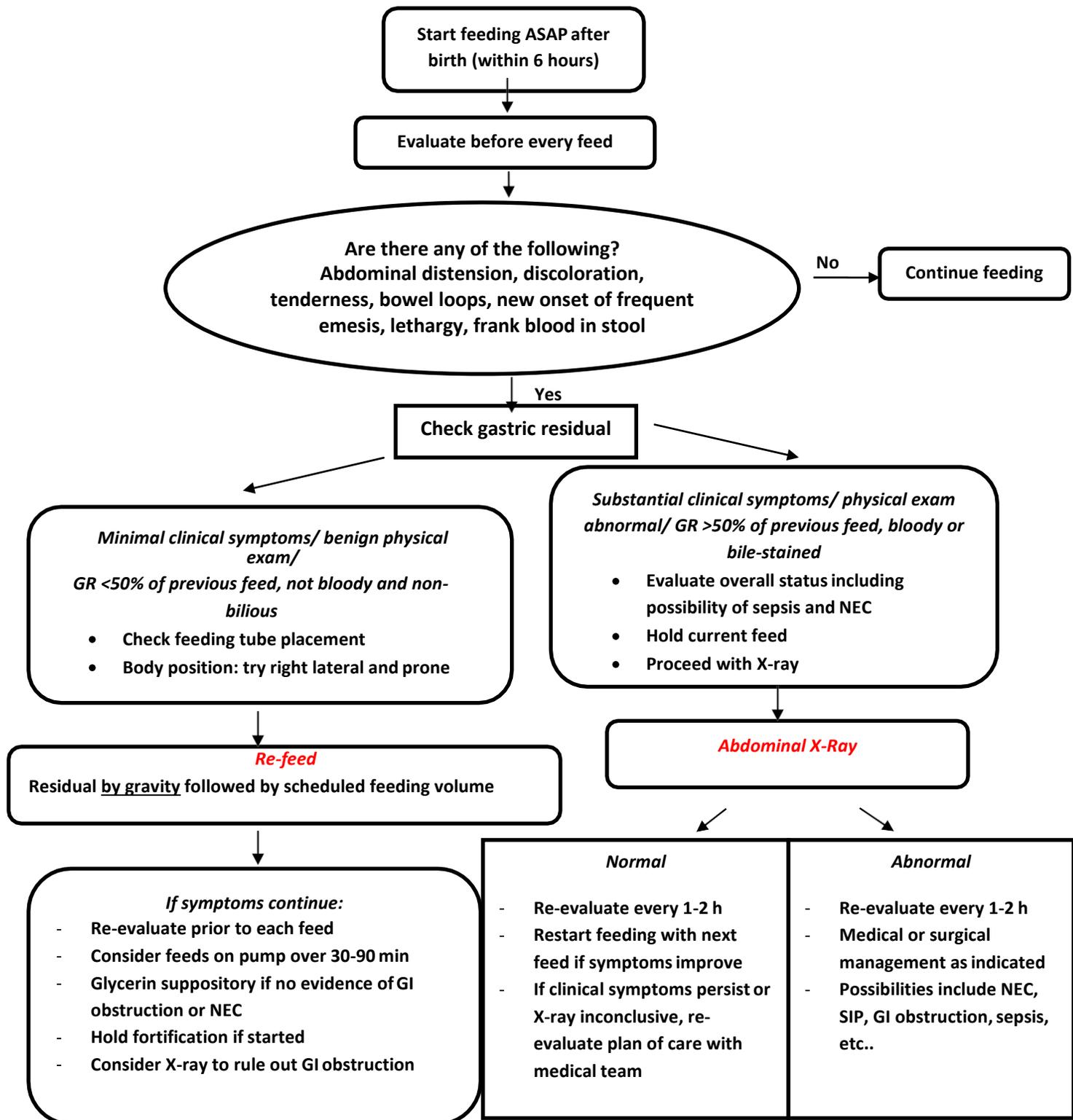
<p>Inject 1–2ml of air using a syringe</p> <p><i>This is NOT a testing procedure</i></p>	<p>Injecting air through the tube may dislodge the exit-port of the feeding tube from the gastric mucosa.</p> <p>Care must be taken when using large syringes on neonates to ensure that the correct amount of air is inserted, i.e., no more than 2 ml.</p>
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<p>Advance or retract the tube by 1–2cm. Stop if there is any resistance or obstruction</p>	<p>If the tube is in the esophagus, advancing it may allow it to pass into the stomach. If the tube has been inserted too far, it may be in the duodenum. Consider withdrawing a few centimeters and re- aspirating. The position of the tube at the nose should already have been recorded and marked, if the tube is in situ. If the mark has not moved then advancing or retracting may not make a difference.</p> <p>Document the length of tube if moved.</p>
<p>If you still cannot obtain aspirate</p>	<p>If this is an initial insertion then consider replacing or re-passing the tube. If the tube has been in situ already, seek advice. Consider whether the length of the tube has changed and discuss options as outlined under the action point on aspirate of pH 6 and above.</p> <p>Record all decisions and their rationale.</p> <p><i>For extremely small preterm infants, if there is any doubt regarding the location of the feeding tube an x-ray for tip location should be considered as the ramifications of malposition are significant.</i></p>

Flow Chart for Oro and Naso Gastric Tube Feeding Decisions



Appendix C: Feeding Intolerance Algorithm



NOTE: Feeding intolerance algorithm adapted from Alberta Health Services with permission

Appendix D

FEEDING SCHEDULE FOR INFANTS: 2250-2500g

Day	Feed Number, Time, and Volume (mL)							
	1	2	3	4	5	6	7	8
1	5	5	8	8	11	11	14	14
2 ^a	17	17	20	20	23	23	26	26
3 ^b	29	29	32	32	35	35	38	38
4	41	41	44	44	47	47	50	50
5	53	53	56	56	59	59	62	62

^a Consider fortifying 50 mL EBM/DBM with 1 package of human milk fortifier (HMF) and increase to 1 package per 25 mL in 24-48 hours as tolerated
^b Consider supplementing vitamins and discontinuing IV

FEEDING SCHEDULE FOR INFANTS: 2000-22249g

Day	Feed Number, Time, and Volume (mL)							
	1	2	3	4	5	6	7	8
1	5	5	7	7	9	9	11	11
2	13	13	15	15	17	17	19	19
3 ^a	21	21	23	23	25	25	27	27
4 ^b	29	29	31	31	33	33	35	35
5	37	37	39	39	41	41	43	43
6	45	45	47	47	49	49	51	51

^a Consider fortifying 50 mL EBM/DBM with 1 package of human milk fortifier (HMF) and increase to 1 package per 25 mL in 24-48 hours as tolerated
^b Consider supplementing vitamins and discontinuing IV

FEEDING SCHEDULE FOR INFANTS: 1750-1999g

Day	Feed Number, Time, and Volume (mL)							
	1	2	3	4	5	6	7	8
1	5	5	6	7	8	8	9	10
2	11	11	12	13	14	14	15	16
3 ^a	17	17	18	19	20	20	21	22
4 ^b	23	23	24	25	26	26	27	28
5	29	29	30	31	32	32	33	34
6	35	35	36	37	38	38	39	40

^a Consider fortifying 50 mL EBM/DBM with 1 package of human milk fortifier (HMF) and increase to 1 package per 25 mL in 24-48 hours as tolerated
^b Consider supplementing vitamins and discontinuing IV

FEEDING SCHEDULE FOR INFANTS: 1500-1749g

Day	Feed Number, Time, and Volume (mL)							
	1	2	3	4	5	6	7	8
1	4	4	5	6	6	7	8	8
2	9	10	10	11	12	12	13	14
3 ^a	14	15	16	16	17	18	18	19
4 ^b	20	20	21	22	22	23	24	24
5	25	26	26	27	28	28	29	30
6	30	31	32	32	33	34	34	35

^a Consider fortifying 50 mL EBM/DBM with 1 package of human milk fortifier (HMF) and increase to 1 package per 25 mL in 24-48 hours as tolerated
^b Consider supplementing vitamins and discontinuing IV

FEEDING SCHEDULE FOR INFANTS: 1250-1499g

Day	Feed Number, Time, and Volume (mL)							
	1	2	3	4	5	6	7	8
1 ^a	2	2	3	4	4	5	5	6
2	7	7	8	8	9	10	10	11
3 ^b	11	12	13	13	14	14	15	16
4 ^c	16	17	17	18	19	19	20	20
5 ^d	21	22	22	23	23	24	25	25
6	26	26	27	28	28	29	29	30

^a Consider providing MEF for 24 hours prior to initiating feeding protocol and starting TPN/lipids
^b Consider fortifying 50 mL EBM/DBM with 1 package of human milk fortifier (HMF)
^c Consider supplementing vitamins and discontinuing IV
^d If tolerating 1 package HMF per 50 mL EBM/DBM, consider increasing to 1 package per 25 mL

FEEDING SCHEDULE FOR INFANTS: 1000-1249g

Day	Feed Number, Time, and Volume (mL)											
	1	2	3	4	5	6	7	8	9	10	11	12
^a	MEF	MEF	MEF	MEF	MEF	MEF	MEF	MEF	MEF	MEF	MEF	MEF
	MEF	MEF	MEF	MEF	MEF	MEF	MEF	MEF	MEF	MEF	MEF	MEF
	MEF	MEF	MEF	MEF	MEF	MEF	MEF	MEF	MEF	MEF	MEF	MEF
1	1.5	1.5	2	2	2	2.5	2.5	3	3	3	3.5	3.5
2	4	4	4	4.5	4.5	5	5	5	5.5	5.5	6	6
3 ^b	6	6.5	6.5	7	7	7	7.5	7.5	8	8	8	8.5
4 ^c	8.5	9	9	9	9.5	9.5	10	10	10	10.5	10.5	11
5 ^d	11	11	11.5	11.5	12	12	12	12.5	12.5	13	13	13
6	13.5	13.5	14	14	14	14.5	14.5	15	15	15	15.5	15.5

^a Initiate MEF within 6 hours of birth; start TPN and lipid infusions
^b Consider fortifying 50 mL EBM/DBM with 1 package of human milk fortifier (HMF) and wean lipid infusion
^c Consider supplementing vitamins and discontinue TPN/lipid infusions
^d If tolerating 1 package HMF per 50 mL EBM/DBM, consider increasing to 1 package per 25 mL

FEEDING SCHEDULE FOR INFANTS: 800-999g

Day	Feed Number, Time, and Volume (mL)											
	1	2	3	4	5	6	7	8	9	10	11	12
^a	MEF	MEF	MEF	MEF	MEF	MEF	MEF	MEF	MEF	MEF	MEF	MEF
	MEF	MEF	MEF	MEF	MEF	MEF	MEF	MEF	MEF	MEF	MEF	MEF
	MEF	MEF	MEF	MEF	MEF	MEF	MEF	MEF	MEF	MEF	MEF	MEF
	MEF	MEF	MEF	MEF	MEF	MEF	MEF	MEF	MEF	MEF	MEF	MEF
	MEF	MEF	MEF	MEF	MEF	MEF	MEF	MEF	MEF	MEF	MEF	MEF
1	1.5	1.5	1.5	2	2	2	2.5	2.5	2.5	3	3	3
2	3.5	3.5	3.5	4	4	4	4.5	4.5	4.5	5	5	5
3 ^b	5.5	5.5	5.5	6	6	6	6.5	6.5	6.5	7	7	7
4 ^c	7.5	7.5	7.5	8	8	8	8.5	8.5	8.5	9	9	9
5 ^d	9.5	9.5	9.5	10	10	10	10.5	10.5	10.5	11	11	11
6	11.5	11.5	11.5	12	12	12	12.5	12.5	12.5	13	13	13
^a Initiate MEF within 6 hours of birth; start TPN and lipid infusions ^b Consider fortifying 50 mL EBM/DBM with 1 package of human milk fortifier (HMF) and wean lipid infusion ^c Consider supplementing vitamins and discontinue TPN/lipid infusion ^d If tolerating 1 package HMF per 50 mL EBM/DBM, consider increasing to 1 package per 25 mL												

FEEDING SCHEDULE FOR INFANTS: 700-799g

Day	Feed Number, Time, and Volume (mL)											
	1	2	3	4	5	6	7	8	9	10	11	12
^a	MEF	MEF	MEF	MEF	MEF	MEF	MEF	MEF	MEF	MEF	MEF	MEF
	MEF	MEF	MEF	MEF	MEF	MEF	MEF	MEF	MEF	MEF	MEF	MEF
	MEF	MEF	MEF	MEF	MEF	MEF	MEF	MEF	MEF	MEF	MEF	MEF
	MEF	MEF	MEF	MEF	MEF	MEF	MEF	MEF	MEF	MEF	MEF	MEF
	MEF	MEF	MEF	MEF	MEF	MEF	MEF	MEF	MEF	MEF	MEF	MEF
1	1	1	1	1.5	1.5	1.5	2	2	2	2	2.5	2.5
2	2.5	3	3	3	3	3.5	3.5	3.5	4	4	4	4
3 ^b	4.5	4.5	4.5	5	5	5	5	5.5	5.5	5.5	6	6
4 ^c	6	6	6.5	6.5	6.5	7	7	7	7	7.5	7.5	7.5
5 ^d	8	8	8	8	8.5	8.5	8.5	9	9	9	9	9.5
6	9.5	9.5	10	10	10	10	10.5	10.5	10.5	11	11	11
^a Initiate MEF within 6 hours of birth; start TPN and lipid infusions ^b Consider fortifying 50 mL EBM/DBM with 1 package of human milk fortifier (HMF) and wean lipid infusion ^c Consider supplementing vitamins and discontinue TPN infusion ^d If tolerating 1 package HMF per 50 mL EBM/DBM, consider increasing to 1 package per 25 mL												

FEEDING SCHEDULE FOR INFANTS: 600-699g

Day	Feed Number, Time, and Volume (mL)											
	1	2	3	4	5	6	7	8	9	10	11	12
^a	MEF	MEF	MEF	MEF	MEF	MEF	MEF	MEF	MEF	MEF	MEF	MEF
	MEF	MEF	MEF	MEF	MEF	MEF	MEF	MEF	MEF	MEF	MEF	MEF
	MEF	MEF	MEF	MEF	MEF	MEF	MEF	MEF	MEF	MEF	MEF	MEF
	MEF	MEF	MEF	MEF	MEF	MEF	MEF	MEF	MEF	MEF	MEF	MEF
	MEF	MEF	MEF	MEF	MEF	MEF	MEF	MEF	MEF	MEF	MEF	MEF
1	1	1	1	1	1.5	1.5	1.5	1.5	2	2	2	2
2	2.5	2.5	2.5	2.5	3	3	3	3	3.5	3.5	3.5	3.5
3 ^b	4	4	4	4	4.5	4.5	4.5	4.5	5	5	5	5
4 ^c	5.5	5.5	5.5	5.5	6	6	6	6	6.5	6.5	6.5	6.5
5 ^d	7	7	7	7	7.5	7.5	7.5	7.5	8	8	8	8
6	8.5	8.5	8.5	8.5	9	9	9	9	9.5	9.5	9.5	9.5
^a Initiate MEF within 6 hours of birth; start TPN and lipid infusions ^b Consider fortifying 50 mL EBM/DBM with 1 package of human milk fortifier (HMF) and wean lipid infusion ^c Consider supplementing vitamins and discontinue TPN infusion ^d If tolerating 1 package HMF per 50 mL EBM/DBM, consider increasing to 1 package per 25 mL												

FEEDING SCHEDULE FOR INFANTS: 500-599g

Day	Feed Number, Time, and Volume (mL)											
	1	2	3	4	5	6	7	8	9	10	11	12
^a	MEF	MEF	MEF	MEF	MEF	MEF	MEF	MEF	MEF	MEF	MEF	MEF
	MEF	MEF	MEF	MEF	MEF	MEF	MEF	MEF	MEF	MEF	MEF	MEF
	MEF	MEF	MEF	MEF	MEF	MEF	MEF	MEF	MEF	MEF	MEF	MEF
	MEF	MEF	MEF	MEF	MEF	MEF	MEF	MEF	MEF	MEF	MEF	MEF
	MEF	MEF	MEF	MEF	MEF	MEF	MEF	MEF	MEF	MEF	MEF	MEF
1	1	1	1	1	1	1	1.5	1.5	1.5	1.5	1.5	2
2	2	2	2	2	2	2.5	2.5	2.5	2.5	2.5	3	3
3 ^b	3	3	3	3	3.5	3.5	3.5	3.5	3.5	4	4	4
4 ^c	4	4	4	4.5	4.5	4.5	4.5	4.5	5	5	5	5
5	5	5	5.5	5.5	5.5	5.5	5.5	6	6	6	6	6
6 ^d	6	6.5	6.5	6.5	6.5	6.5	7	7	7	7	7	7
7	7.5	7.5	7.5	7.5	7.5	8	8	8	8	8	8	8.5
^a Initiate MEF within 6 hours of birth; start TPN and lipid infusions ^b Consider fortifying 50 mL EBM/DBM with 1 package of human milk fortifier (HMF) and wean lipid infusion ^c Consider supplementing vitamins and discontinue TPN infusion ^d If tolerating 1 package HMF per 50 mL EBM/DBM, consider increasing to 1 package per 25 mL												

FEEDING SCHEDULE FOR INFANTS: 400-499g

Day	Feed Number, Time, and Volume (mL)											
	1	2	3	4	5	6	7	8	9	10	11	12
^a	MEF	MEF	MEF	MEF	MEF	MEF	MEF	MEF	MEF	MEF	MEF	MEF
	MEF	MEF	MEF	MEF	MEF	MEF	MEF	MEF	MEF	MEF	MEF	MEF
	MEF	MEF	MEF	MEF	MEF	MEF	MEF	MEF	MEF	MEF	MEF	MEF
	MEF	MEF	MEF	MEF	MEF	MEF	MEF	MEF	MEF	MEF	MEF	MEF
	MEF	MEF	MEF	MEF	MEF	MEF	MEF	MEF	MEF	MEF	MEF	MEF
1	1	1	1	1	1	1	1	1.5	1.5	1.5	1.5	1.5
2	1.5	2	2	2	2	2	2	2	2.5	2.5	2.5	2.5
3 ^b	2.5	2.5	3	3	3	3	3	3	3	3.5	3.5	3.5
4 ^c	3.5	3.5	3.5	4	4	4	4	4	4	4	4.5	4.5
5	4.5	4.5	4.5	4.5	5	5	5	5	5	5	5	5.5
6 ^d	5.5	5.5	5.5	5.5	5.5	6	6	6	6	6	6	6
7	6.5	6.5	6.5	6.5	6.5	6.5	7	7	7	7	7	7
^a Initiate MEF within 6 hours of birth; start TPN and lipid infusions ^b Consider fortifying 50 mL EBM/DBM with 1 package of human milk fortifier and wean lipid infusion ^c Consider supplementing vitamins and discontinue TPN infusion ^d If tolerating 1 package HMF per 50 mL EBM/DBM, consider increasing to 1 package per 25 mL												

Appendix E

NOTE:

1. *Dietitian to assess vitamin intake and supplement accordingly.*
2. *Trademark products may be replaced with generic or other products which have the same dosages.*

Iron

EBM/DBM with Human Milk Fortifier or Formula:

Weight (kg)	Dose of Supplemental Elemental Iron to Meet Recommended Iron Requirements		
	2 mg/kg/d	4 mg/kg/d	6 mg/kg/d
Less than 1.0	N/A	1.85 mg once daily	3.75 mg once daily
1.0-1.5	N/A	1.85 mg once daily	3.75 mg once daily
1.5-2.0	N/A	3.75 mg once daily	7.5 mg once daily
2.0-2.5	N/A	3.75 mg once daily	7.5 mg once daily
2.5-3.0	N/A	3.75 mg once daily	7.5 mg once daily
3.0-3.5	N/A	7.5 mg once daily	7.5 mg BID
Greater than 3.5	N/A	7.5 mg once daily	7.5 mg BID

Unfortified EBM/DBM or EBM/DBM Fortified with Human Milk-Based Fortifier or Powdered Formula:

Weight (kg)	Dose of Supplemental Elemental Iron to Meet Recommended Iron Requirements		
	2 mg/kg/d	4 mg/kg/d	6 mg/kg/d
Less than 1.0	1.85 mg once daily	3.75 mg once daily	3.75 mg once daily
1.0-1.5	1.85 mg once daily	7.5 mg once daily	7.5 mg once daily
1.5-2.0	3.75 mg once daily	7.5 mg once daily	7.5 mg once daily
2.0-2.5	3.75 mg once daily	7.5 mg once daily	7.5 mg BID
2.5-3.0	3.75 mg once daily	7.5 mg once daily	7.5 mg BID
3.0-3.5	7.5 mg once daily	7.5 mg BID	7.5 mg BID
Greater than 3.5	7.5 mg once daily	7.5 mg BID	7.5 mg TID

Vitamin A, D and C

The table below shows the recommended daily supplementation for infants based on the type of nutritional intake they are receiving. The intention is for an infant to receive no more than 1000 International Units (IU) of Vitamin D per day.

Gestational Age at Birth	Breast Milk	Formula +/- Some Breast Milk	Human Milk Fortifier
Greater than or equal to 35 weeks	800 International Units Vitamin D	400 International Units Vitamin D	N/A
Less than 35 weeks	400 International Units Vitamin D, 1 mL Multivitamin A,C,D	1 mL Multivitamin A,C,D	1 mL Multivitamin A,C,D

Continue Vitamin D indefinitely

When consuming more than 1L/day or weigh more than 6.4kg (of any feeding regimen) discontinue Multivitamin A,C,D. If consuming breastmilk exclusively, provide 800 International Units of vitamin D from all sources.

For all infants receiving human milk-based fortifier provide Multivitamin A,C,D with niacin, thiamine, and riboflavin.

Folic Acid

All Infants with birth weight less than 1500 g: 50 mcg/d until greater than 1500 g

Appendix F

Eating in S.I.N.C.*

*Safe Individualized Nipple-Feeding Competence"

A. Offer NNS with pumped breast or soother
Able to maintain competent state

B. Max 5% enteral feed volume
Max 10 min by breast (gift) OR
Max 5 min drops on soother

C. Max 10% enteral feed volume
Max 10 min by breast (gift) OR
Max 5 min drops on soother

D. Max 15% enteral feed volume
Max 15 min by breast OR
Max 10 min feed time nipple

E. Max 20% enteral feed volume
Max 15 min by breast OR
Max 10 min feed time bottle

F. Max 30% enteral feed volume
Max 20 min by breast OR
Max 15 min feed time bottle

G. Max 40% enteral feed volume
Max 20 min by breast OR
Max 15 min feed time bottle

H. Max 50% enteral feed volume
Max 20 min by breast OR
Max 20 min feed time bottle

I. Max 60% enteral feed volume
Max 20 min by breast OR
Max 20 min feed time bottle

J. Max 70% enteral feed volume
Max 20 min by breast OR
Max 20 min feed time bottle

K. Max 85% enteral feed volume
Max 20 min by breast OR
Max 20 min feed time bottle

L. Transition to semi-demand feeds
Max 30 min feed time. Q2.5-3.5 hr
(breast or bottle)*

Used with permission from the
Alberta Regional Health Authority

Appendix G

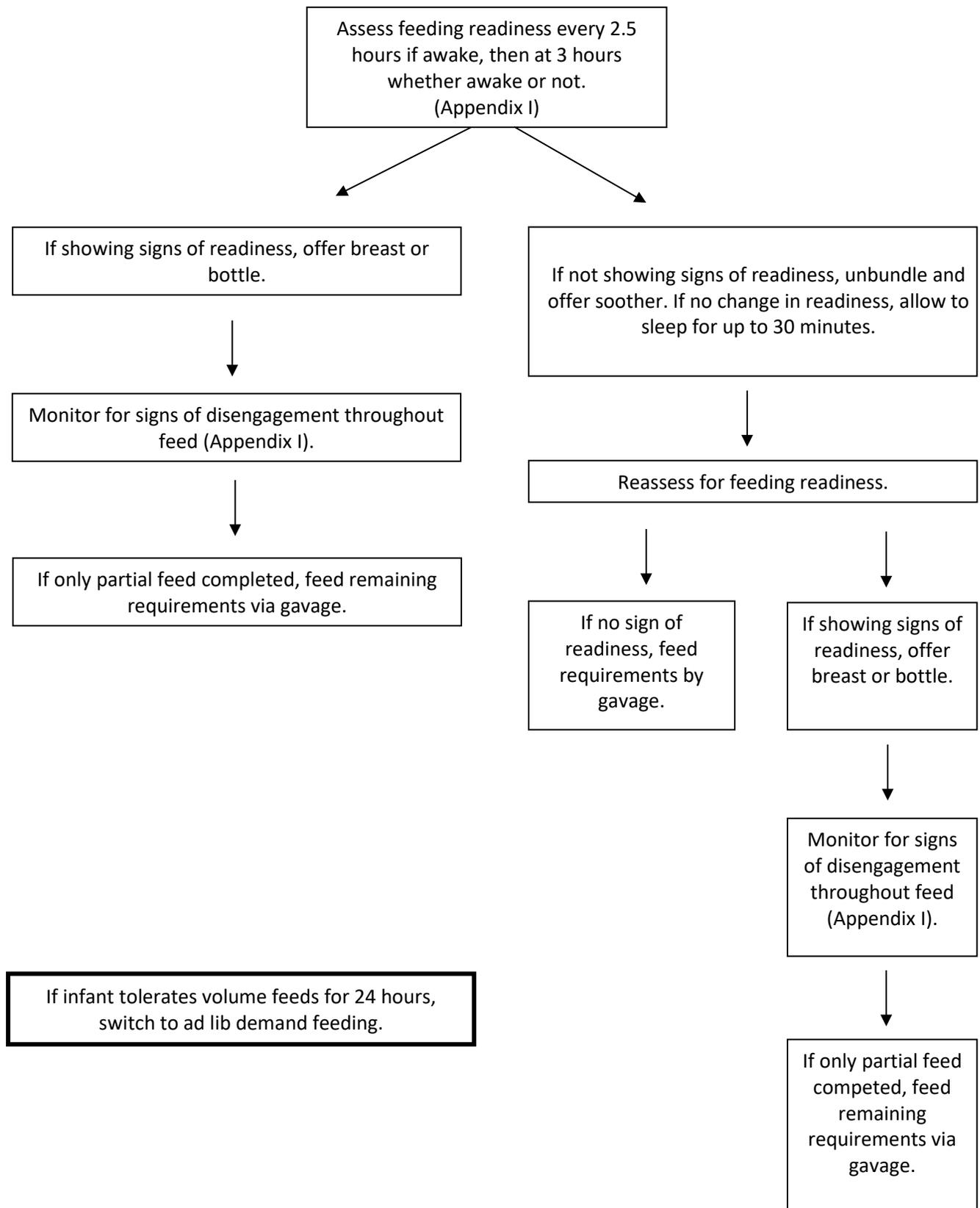
Infant-Driven Feeding Readiness Scale

Score	Description
A. Feeding readiness scale	
1	Drowsy, alert, or fussy before care
	Rooting and/or bringing of hands to mouth/taking of pacifier
	Good tone (presupposes autonomic stability)
2	Drowsy or alert once handled
	Some rooting or taking of pacifier
	Adequate tone
3	Briefly alert with care
	No hunger behaviors
	No change in tone
4	Sleeps throughout care
	No hunger cues
	No change in tone
5	Needs increased oxygen with care
	Apnea and/or bradycardia with care
	Tachypnea greater than baseline with care

Note: Determine if infant is demonstrating signs of feeding readiness prior to initiating SINC D. Initiate SINC D if infant is demonstrating signs per level 1 or 2 as indicated above in this scale.

Appendix H

Semi-Demand/ Cue Based Feeding Algorithm



Appendix I: Semi-Demand/ Cue Based Feeding Signs of Readiness and Disengagement

Readiness to Feed	When to Stop/ Disengagement Signs
<p style="text-align: center;">Stability (must show all)</p> <ul style="list-style-type: none"> • Minimal respiratory support (i.e., nasal prongs) • Stable vital signs / minimal work of breathing (consider respiratory rate, retractions, grunting, tachycardia) • Minimal events with handling (apnea, bradycardia, desaturation) • Tolerates gavage feeds • Stable with non-nutritive sucking (NNS) 	<p style="text-align: center;">State/ Behavior</p> <ul style="list-style-type: none"> • Not engaged with feed (e.g. staring off) • Falling asleep and not able to re-alert with gentle stimulation • Pulling away and becoming irritable • Gagging, gulping, coughing, hiccupping, emesis/ regurgitation • Changes in muscle tone from baseline (e.g, flaccid or stiff muscle tone)
<p style="text-align: center;">Behavior (must show all)</p> <ul style="list-style-type: none"> • Tolerates handling without significant respiratory issues or stress • Alert with handling or when given soother • Achieves and sustains a quiet alert state prior to feeding 	<p style="text-align: center;">Sucking Pattern</p> <ul style="list-style-type: none"> • Loss of active sucking despite gentle encouragement • Loss of coordination • Change to sporadic, short and weak sucking bursts
<p style="text-align: center;">Feeding Cues</p> <ul style="list-style-type: none"> • Sustained NNS on soother • Alert and awake • Hands to mouth • Rooting 	<p style="text-align: center;">Vital Sign Changes/ Respiratory Distress</p> <ul style="list-style-type: none"> • Frequent desaturations • Increased work of breathing • Bradycardia • Tachycardia • Stridor, retractions, tracheal tug
<p style="text-align: center;">Gestational age</p> <ul style="list-style-type: none"> • At least 33 weeks (maturation and the full clinical picture are more important predictors of readiness than age alone) 	<p style="text-align: center;">Monitoring and Time Considerations</p> <ul style="list-style-type: none"> • Watch for disengagement cues at all times throughout a feed • Stop feed based on cues above at any point during feed • Beginner feeders may tolerate feed for only a few minutes • Feed only to a max of 30 minutes