 <b>Covenant Health</b> <i>Compassionate care led by Catholic values</i>	<b>Enteral Feeding Guidelines          Neonatal Critical Care Program</b>	<b>Neonatal Guidelines</b>
		<b>Policy Group:</b> GI/GU
<b>Approved by:</b>  <b>Gail Cameron</b> Senior Director Operations, Maternal, Neonatal & Child Health Programs  <b>Dr. Paul Byrne</b> Medical Director, Neonatology  <b>Dr. Sharif Shaik</b> Medical Director, Neonatology		<b>Date Effective</b> November 2015  <b>Next Review</b> November 2018

**Purpose** The purpose of this guideline is to promote best practice in the enteral feeding and assessment for at risk neonates in the Covenant Health Neonatal Critical Care Program.

**Policy Elements**

- When to Start**
- What to Feed**
- Volume of Feed**
- When to Stop**
- Feeding Method**
- Milk Storage**
- Milk Preparation**
- Feeding Equipment** - Feeding tubes, administration sets & lines, bottles, nipples
- Special Feeding Conditions** – Cleft lip & palate, gastro-esophageal reflux
- Documentation**

**Applicability** Compliance with this guideline is required by all Covenant Health employees, members of the medical staff, students, volunteers, and other persons acting on behalf of Covenant Health Edmonton Acute Neonatal Critical Care Program (including contracted services providers as necessary).

**When to Start** Enteral feeds are ordered by a Neonatologist or designate when stable. Elements of clinical stability include:

- Ability to tolerate increased oxygen consumption associated with feeding.
- No cardiovascular or respiratory instability sufficient to compromise GI perfusion.
- Abdominal exam: non tender, non-reddened, stooling, no blood in the stools, with the presence of bowel sounds.
- No surgical abdominal condition.
- No omphalitis.

**ENTERAL PRIMING**

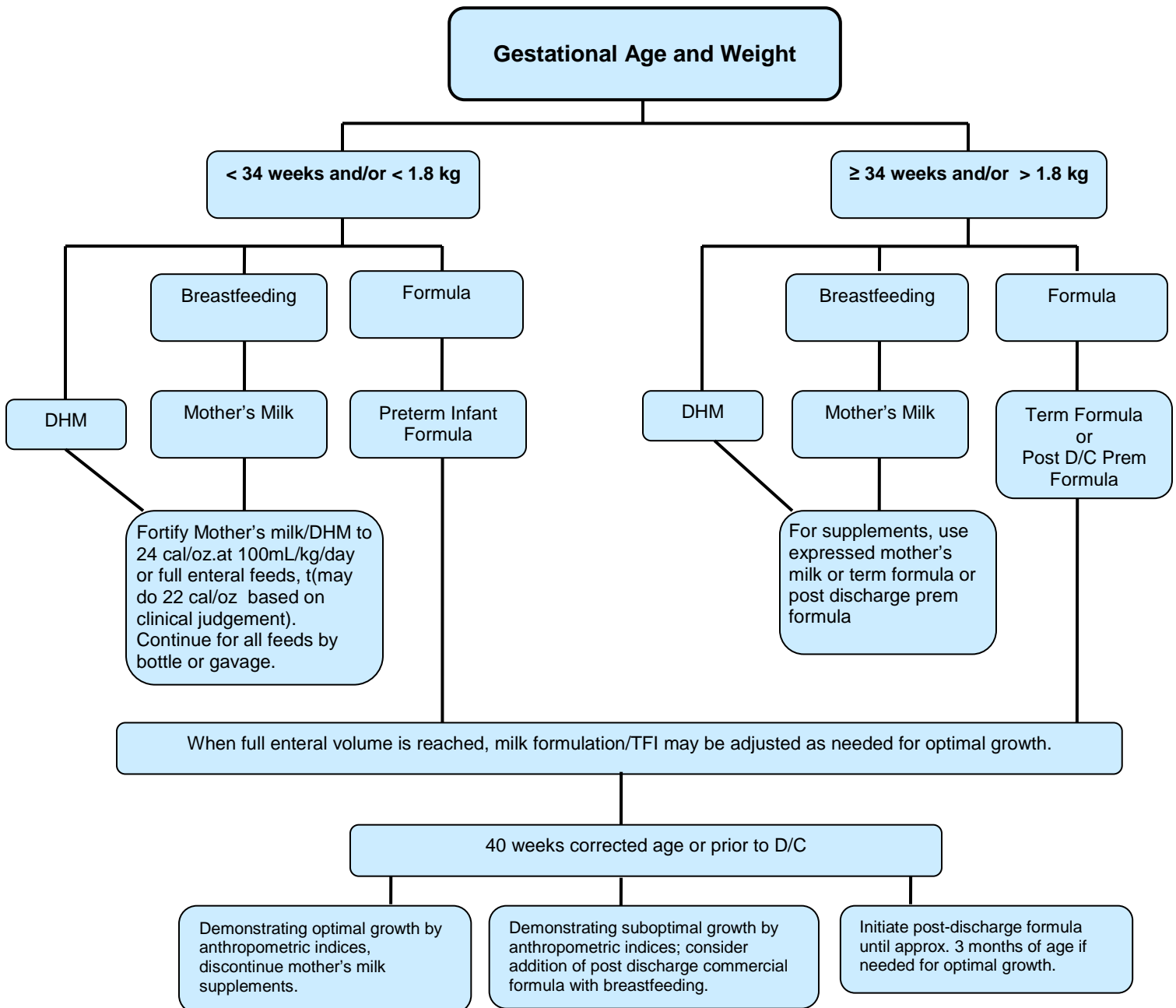
Enteral priming is used to prevent mucosal atrophy, to enhance gut readiness, and to improve tolerance of full enteral feeds. Small volumes of milk are given at the time when more aggressive feeds are not possible. The period of enteral prime may be prolonged depending on the infant’s condition and ability to tolerate feeds. Advancements in feeds are determined in consideration with the baby’s condition and may not occur on a daily basis.

Milk volume from enteral priming is not included in the infant’s total fluid volume unless ordered otherwise.

**What to Feed**

Colostrum, fresh or frozen, is used as the initial milk if available. Consider for use for oral immune therapy – refer to policy for dosing and further information.  
Fresh mother’s milk is the preferred milk for feeds, Donor Human Milk or Formula may be considered.

Appendix A



**Volume of  
Feed**

1. Stable term and older late-pre-term infants (**35 weeks and greater**) without respiratory distress, renal problems, neurological problems, congenital heart problems or gastrointestinal problems should be fed demand volumes.
2. Otherwise healthy, premature infants (**32-35 weeks gestation**) should have their feeds increased gradually throughout the first day. If the infant is not able to tolerate enteral feeds of **60 mL/kg/day by the end of 24 hours**, it may be reasonable to leave the healthy preterm 32-35 week infant at slightly below recommended daily volumes. If the feeds are progressing slowly, the physician/designate should be consulted about ordering parenteral fluid.
3. Otherwise healthy, premature infants **less than 32 weeks gestation** who are not receiving their total ordered fluid requirements by milk, should have parenteral fluid ordered and administered until feeds are at 120 mL/kg/day.
4. For small and/or sick babies, volume of full feeding is determined by fluid calculations.
  - Refer to **Fluid Management Policy** for specific fluid guidelines.
  - Refer to the guideline below for feed initiation and advancement guidelines.  
Appendix B
  - When the daily total fluid intake is increased, *feeds need to be gradually increased over the course of the day.*
5. As enteral feeds increase, parenteral fluid decreases to equal total daily fluid requirements.
6. Intravenous fluids and/or parenteral nutrition may be stopped in **many** infants receiving 120 mL/kg/day enterally.
7. Feeds for gastrointestinal surgical babies will be determined on an individual basis.
8. Clinical status, feeding tolerance, and other clinical circumstances may require a change from the guidelines and will be directed by a physician or designate.

## Covenant Health NICU Feeding Clinical Practice Guidelines Appendix B

Exclusion: significant anomalies including congenital heart disease and structural GI abnormalities

<b>Birth Weight 750g - 1800g</b>				
<b>Calculation Weight (kg)</b>	<b>Enteral Prime x min. 24 h (10-24 ml/kg/d)</b>	<b>Feed Advancement (25-35 ml/kg/d)</b>	<b>Feed Advancement if IUGR &lt;10<sup>th</sup> percentile (~20 ml/kg/d)</b>	<b>Add HMF* (100 ml/kg/d)</b>
0.8	1ml q 2h	0.5 ml q 6h	0.5 ml q 8h	6.5 ml q 2h
0.9	1 ml q 2h	0.5 ml q 6h	0.5 ml q 8h	7.5 ml q 2h
1.0	1.5 ml q 2h	1 ml q 12h	0.5 ml q 8h	8 ml q 2h
1.1	1.5 ml q 2h	1 ml q 8h	1 ml q 12h	9 ml q 2h
1.2	2 ml q 2h	1 ml q 8h	1 ml q 12h	10 ml q 2h
1.3	2 ml q 2h	1 ml q 8h	1 ml q 12h	11 ml q 2h
1.4	2 ml q 2h	1 ml q 8h	1 ml q 12h	12 ml q 2h
1.5	3 ml q 3h	2 ml q 9h	1 ml q 6h	19 ml q 3h
1.6	3 ml q 3h	2 ml q 9h	1 ml q 6h	20 ml q 3h
1.7	4 ml q 3h	2 ml q 9h	1 ml q 6h	21 ml q 3h
1.8	4 ml q 3h	2 ml q 9h	1 ml q 6h	22 ml q 3h

<b>Birth Weight 1850g - &gt;2500g</b>				
<b>Calculation Weight (kg)</b>	<b>Initiation of Feeds</b>	<b>Feed Advancement (as tolerated)</b>	<b>Feed Advancement if IUGR &lt;10<sup>th</sup> percentile (~20 ml/kg/d)</b>	<b>Add HMF* (100 ml/kg/d)</b>
1850-2000g	5 ml q 3h	2 ml q 6h	2 ml q 9h	↑TFI +/- add HMF at RD discretion
2001-2500g	5 - 10 ml q 3h	3 - 5 ml q 6h	2 ml q 9h	
>2500g	10 - 15 ml q 3h	5 ml q3h-6h	2 ml q 6h	
Infants that are stable and >36 weeks gestation should be fed ad lib demand volumes.				

\*HMF addition policy may be modified based on clinical judgement.

Note: Enteral prime should be considered if patient is receiving a single inotrope at low dose (e.g. dopamine  $\leq 5$  mcg/kg/min; dobutamine  $\leq 5$  mcg/kg/min, or epinephrine  $\leq 0.02$  mcg/kg/min; or any dose of milrinone. Feeding is contraindicated with any dose of Norepinephrine.

**When to Stop**

Feedings are held and the charge nurse notified for signs related to feeding problems. These include: **Bilious vomiting; abdominal distention, redness, or tenderness; significant apnea, bradycardia or cyanosis with feeding; & bloody stool.** Feed volumes, frequencies, and/or methods of administration need to be assessed if the infant is regurgitating feeds, not gaining weight adequately, or if there is a greater number of apnea and bradycardia episodes with or following feeds. Consider changing feed volume or method of feeding first before stopping feeds for infants with these problems. Gastric aspirate volumes are not measured to assess feeding tolerance.

**Feeding Method**

The method of feed administration varies with the condition of the infant. Because nipple feeding requires a coordinated suck/swallow/breathing pattern, and energy to suckle, breast or bottle feeds may not be possible in many NICU patients when enteral feeds are initiated. Although infants can suck as early as 18 weeks post conceptional age, a coordinated suck/swallow reflex is usually not present until 34± 2 weeks post conception. Infants not nipple feeding are encouraged to associate sucking with milk delivery by offering a non-nutritive sucking experience during milk delivery.

**Gavage feeds** are indicated if an infant:

1. Is <32 weeks post-conceptional age
2. Has uncoordinated suck/swallow/breathing
3. Has no gag reflex & neurological impairment
4. Is receiving CPAP, HFNC, on a ventilator
5. Is acutely ill
6. Is requiring continuous feeds
7. Has a weak cry

Gastric feeding is the usual type of gavage feeding. Gastric feeding tubes are inserted by health care professional unless parents are learning to gavage feed at home. Parents/caregivers may hold their baby during gavage feed, if the tube is taped in position and are encouraged to perform skin to skin throughout feeding. Jejunal feeds may be ordered for infants with severe feeding problems. Jejunal feeding tubes are inserted by authorized practitioners.

**Feeding  
method****Bolus and Continuous Feeds**

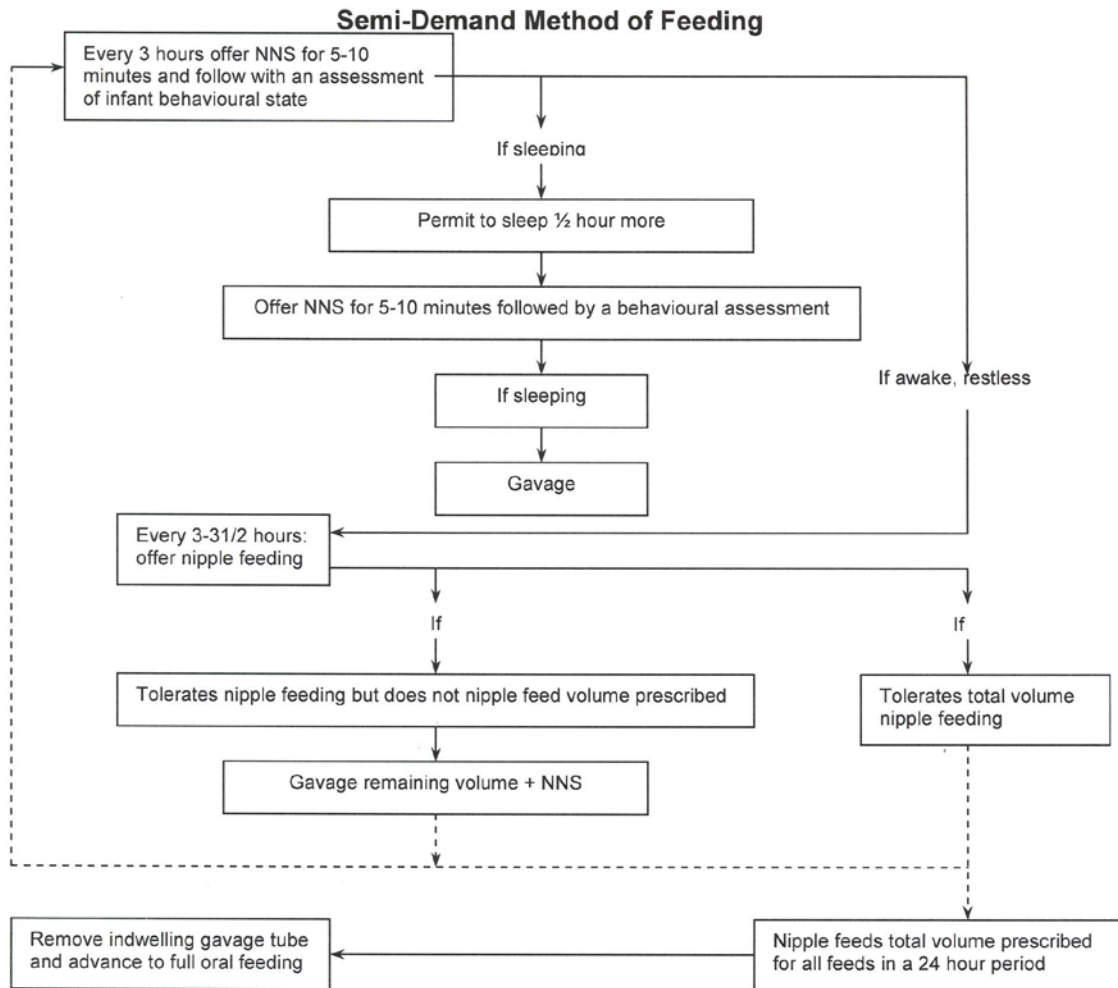
Clinical risks and benefits of continuous and intermittent gastric tube milk feeds can not be determined reliably from research information available. For mature infants with cardiac or malabsorption problems, there may be better gut absorption from continuous feeds that could improve weight gain. Bolus feeds also temporarily impair pulmonary function. For these reasons, continuous feeds are considered for infants with significant respiratory disease, cardiac failure, extremely low birth weight infants and infants that do not tolerate bolus feeds.

Continuous feeds of human milk are administered in a syringe with tip pointed up but below the level of the baby via a syringe pump to allow the fat to be delivered to the baby. Jejunal feedings must be given by continuous administration since there is not "space" to store bolus feeds in that part of the bowel. Jejunal feedings can be used for infants with serious gastro-esophageal reflux disease (GERD) symptoms, or for infants unable to protect their airway. As the patient's condition improves, discussion occurs within the multi-disciplinary team on the transition from continuous to bolus feeds.

**Oral Feeding**

The baby's PCA and medical condition as well as the parent's input determine breast or bottle feeds. Some infants may require a plan of oral stimulation before initiation of oral feedings. An Occupational Therapist or Speech Pathologist should be consulted to assess infants having difficulty with oral feedings. Convalescent babies should be transitioned to demand feeds through the semi-demand method of feeding if they:

1. Are at least 32-35 weeks PCA
2. Are able to maintain oxygenation with low flow oxygen
3. Have a loud, audible cry
4. Have intact suck and gag reflexes
5. Tolerate full enteral bolus feeds



**Breast Feeding**

Breast feeding is encouraged and supported as the optimal method of feeding. To assess the infant's reflexes and ability to breast feed, the nurse must be present for the feeding. Documentation of feeds includes information on latch, suck, swallow, and duration of feeding. Volume of feed may be determined by the use of pre and post weights. Information on clinical indices such as maternal milk supply, milk ejection, and changes in breast fullness may also provide helpful information.

The best and most efficient way for a mother to empty her breasts is to breastfeed her infant. If the infant is not breast feeding effectively, then she should pump after each feeding and/or every three hours with an electric pump to ensure a continued supply of milk. Electric breast pumps are available in the NICU for use by mothers who are pumping.

Infants with congenital heart disease or chronic lung disease may have reduced energy reserves resulting in short and frequent breastfeeding sessions. Therefore, these infants may need to breastfeed frequently for short periods of time. These infants will likely require supplemental calories to meet their requirements.

**Bottle Feeding**

There are a number of bottles available for feeding. The volume within the bottle influences the baby's ability to create suction pressure. Generally speaking, the infant will be more successful with a smaller bottle so plastic graduated feeders are preferred. The type of nipple also influences the success of the feed. Nipples designed for preterm babies have a fast flow and should not be used as they collapse easily, and allow too much milk flow resulting in loss of control. Infants with weak sucks may do better with a high flow nipple if they are able to swallow larger volumes effectively. The baby's soother should approximate the size and shape of the nipple used for feeds.

A preterm or convalescing infant may require pacing during feeding. Watch the suck swallow-breathing pattern. If the infant is not taking regular breaths, either remove the nipple from the infant's mouth to allow for a breath or tip the nipple and container so that there is no milk in the nipple.

Refer to Bottle Feeding Policy and Procedure for bottle/nipple types and uses.

**Gastrostomy Tubes**

Some infants can not take enough milk by nipple to meet their nutritional needs. This may occur as the result of neurodevelopmental problems, congenital anomalies etc. If the problem is considered long-term, a gastrostomy tube may be indicated for feeds.



## MILK STORAGE

MILK	CONDITIONS	TIME
<b>Formula-</b> ready to feed or prepared from liquid concentrate or powder	Room temperature Refrigerator	<b>2</b> hours <b>24</b> hours
<b>Mom (mom's own milk)</b>	Room temperature Refrigerator: <b>Fresh</b> <b>Thawed</b>  Freeze <b>MOM</b> immediately if not to be used within 48 hours - fridge freezer - deep freeze (-20 <sup>o</sup> )	<b>4</b> hours  <b>48</b> hours <b>24</b> hours  <b>3</b> months <b>1</b> year
<b>DHM (donor human milk)</b>	Room Temperature Thawed	<b>4</b> hours <b>24</b> hours
<b>MOM/DHM</b> with powdered additives (HMF or powder)	Room temperature	<b>2</b> hours
<b>Milk (any)</b> with additives (any)	Refrigerator	<b>24</b> hours
<b>Milk</b> used for bottle feeding	Room temperature	<b>1</b> hour after initiation of feed
<b>Milk</b> should be stored in a refrigerator designated for that purpose only		

**Thawing** Frozen Human Milk can be thawed using thaw cycle on breast milk warmer.

**Milk Preparation** Preparation of milk (adding electrolytes or fortifier to milk) should be done with an aseptic technique at the milk preparation counters. Milk is warmed with the use of milk warmers. Milk is not to be left warming for more than 15 minutes. Milk needs to be identified by a second person (RN, physician or parent/caregiver) before administration using the original infant identification label. Milk will be signed off on the nursing flowsheet by the individuals doing the verification.

### Feeding Equipment

#### 1. Feeding Tubes

- **Measurement.** Gastric tube insertion depth is measured from the insertion site of the tube to the ear and then to a point midway between the zyhoid and the umbilicus. Keep the head turned to the side for maximum extension when measuring.
- The naris used for enteral feeding tubes should be alternated with next tube placement if possible.
- **Location criteria.** Nasogastric (NG) and orogastric (OG) tube

Nasogastric Tube	Orogastric Tube
Infant that tolerates tube size without nasal airway compromise	Infants less than 1200 grams with no ETT
Bolus or continuous feeds	Bolus feeds (except for infants <1200 grams) With use of Arabella CPAP

**Feeding  
Equipment**
**2. Size, Material, Frequency of change and Indications for use**

Size	Material	Change Frequency	Indications
#5	Polyurethane	Q 30 days	Infants less than 1500 grams
#6.5	Polyurethane	Q 30 days	Infants greater than 1500 grams receiving pump feeds
# 8	Polyurethane	Q 30 days	As an OG tube for infants receiving nCPAP which is utilized for feeds and venting of air from the stomach

Indwelling Feeding Tubes	Intermittent Feeding Tubes
<ul style="list-style-type: none"> <li>• Infants with continuous feeds or all gavage feeds</li> <li>• Infants on semi-demand feeds</li> </ul>	<ul style="list-style-type: none"> <li>• Infants needing occasional gavage feeds</li> </ul>

**3. Securing Placement.**

- OGT is taped in the midline position to reduce looping. NGT are taped to the upper lip to minimize looping and notching to the naris. For feeding tubes left in situ, note the insertion depth for placement verification. Document this on the kardex and Nurses Notes: include date, time and catheter size .

**2. Syringes/Feeding Administration Lines and Sets**

- Feeding tubes left in situ are cleared with sterile water between feeds.
- Syringes that have been used to feed one infant should not be reintroduced into bottles of formula used for other infants.
- Syringes are single use only and extension sets are used for 24 hours with flushing with sterile water between every feed.
- Tubing and administration sets used for feeding should be DEHP free.
- All tubing and syringes used for feeds will be feed specific (“anti-IV” system) to prevent attachment to an intravenous line.
- In order to reduce the risk of bacterial contamination when milk is given continuously by gavage tube, change the syringe with MOM, DHM, or formula according to maximum allowable time (see Milk Storage Chart), so that the milk in the administration set is not at room temperature for more than the maximum time allowed.

**Feeding  
Equipment****3. Specialty Bottles**

- Habermann Feeders, Cleft Palate bottles and Dr. Brown's bottles may be used for more than one feed when rinsed until clear with sterile water.
- Refer to Bottle Feeding P & P for specialty bottles/nipples

**4. Nipples**

- Nipples from special feeding systems (e.g. Habermann Feeder) should be rinsed with sterile water between feeds and allowed to dry.
- Soothers should be discarded when visibly dirty, or if contaminated.

**Special  
Feeding  
Conditions*****Cleft Lip and Palate***

Feeding is more difficult for the baby with cleft lip and/or palate because they are usually unable to generate enough negative pressure for sucking, and the oral and nasal cavity may not be separated. A referral should be made to the Cleft Lip and Palate Clinic.

Strategies to improve feeding include the following:

1. Feed in an upright position so that gravity helps prevent milk from going through the nose.
2. Use equipment that allows for the flow of milk into the infant's mouth despite a weak suck and use a long nipple (Habermann Feeder)
3. Burp frequently since these infants tend to swallow a lot of air during feedings.
4. Limit nipple feeding to 20-30 minutes to prevent excessive tiring.

Exclusive breastfeeding needs to be assessed carefully since it rarely meets the infant's nutritional needs. Mothers who want the benefits of breast milk should initiate breast pumping. Before discharge, an infant should spend no more than 30 minutes to feed 40-60 mL.

### *Gastro-esophageal Reflux*

Gastro-esophageal reflux (GER) is the upward movement of stomach contents through the cardiac sphincter into the esophagus. GER is very common in infants, especially preterm infants, and is considered normal. Reflux that causes problems is referred to as gastro-esophageal reflux disease (GERD). In these situations, the milk and gastric contents cause problems such as esophagitis or pulmonary aspiration. Over a long period, oral feeding may be affected as the infant associates feeding with trachea and esophagus irritation.

GERD can be reduced with several strategies.

- Small volume feedings reduces reflux as the stomach does not overflow.
- Modifications to maternal diets for babies receiving Mom's own breastmilk to restrict cow's milk protein.
- Thickening of feeds.
- Continuous feedings may help because of the small volumes, but the continuous placement of a feeding tube leaves the cardiac sphincter partially open and may make reflux more likely
- Holding the baby completely upright after feedings. An upright position in a chair compresses the stomach and increases the amount of reflux.
- Medications may be used to decrease gastric acidity

Diagnosis of GERD is difficult in the newborn patient due to milk feedings and low gastric acidity. Interventions to reduce GERD will be discussed by the multidisciplinary care team. The plan developed should be documented in the Kardex.

**Documentation** The type of milk, (batch number if DHM), amount administered, double initials if MOM or DHM is given. and route of feeding should be indicated on the nursing record Oxygen requirements; colour; pre and post feeding states; regurgitation; gagging; coughing; suck/swallow/breathing ratio, sound during swallow; and time taken to feed should also be noted. Feeding strategies particular to an infant should be noted on the Kardex.

The infant's weight should be recorded daily, and marked on the daily weight graph sheet to monitor trends in weight. The head circumference and length should be plotted weekly on the growth curve charts.

### **Related Policies**

- Two patient identifiers
- Bottle feeding
- Breast Milk/Human Milk
- IPC Guidelines for Handling of Expressed Breast Milk
- Mothers Milk Safe Handling and Administration
- Human Milk
- Human Milk Misappropriation
- Breastfeeding (BFI)
- Fluid Management
- Gastric Gavage Feeding
- Jejunostomy Tube Care and Feeds
- Line & Tubing Verification
- Oral Immune Therapy
- Soothers
- Prebiotic Usage

## References

- Adapted with permission from the Stollery Children's Policy and Procedure Manual:  
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                         November 2015

## Signing

*Original Signed*

25/01/2016

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