1.0 PURPOSE AND INTENT:
1.1 To provide process and procedure for orally feeding infants in the Neonatal Intensive Care Unit.

2.0 PRACTICE OUTCOME:
2.1 Safe oral feeding for infants who are at risk for having cardiorespiratory events associated with feeding as well as development of positive feeding skills and prevention of later development of oral aversion.

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

3.0 GENERAL GUIDELINES
3.1 Use only syringes and tubing that are specifically designed for enteral feeding and cannot be attached to any intravenous access location.

3.2 Prepare any powder added to feeds using aseptic food safety handling techniques which includes:
   3.2.1 Sanitizing of preparation surface with approved disinfectant and allowing to dry
   3.2.2 Hand hygiene and wear clean gloves for all feeding preparation.
   3.2.3 Avoid touching any portion of the feeding system that will come into contact with the milk.

3.3 For bolus bottle or gavage feeds, discard any unused feed that has been warmed after 2 hours.

3.4 Change feeding frequency to every 3 hours when baby has demonstrated tolerance of full feedings and is above 1250 gram current weight.

3.5 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.

3.6 For infants who are on full enteral feeds and have achieved their birthweight, adjust volume of feeds on weights on Mondays and Thursdays. Weigh baby only twice a week, unless there are other medical indications to weigh baby more often.

4.0 GAVAGE FEEDING
4.1 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.

4.2 Unless using freshly pumped milk, Warm milk to the appropriate temperature using the commercial milk warmer according to manufacturer’s instructions.

4.3 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. With larger volumes for infants on full feedings the bolus feed takes approximately 15 minutes to complete.
4.3.1 If using gravity feeding method, attach a large syringe (appropriate for the volume to be fed) with the plunger removed, to the feeding tube and pour the milk into it. Hold the syringe just above the infant's head so the feed infuses slowly.
4.3.2 If using push feeding method, attach the syringe to the feeding tube and push slowly.
4.4 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.

4.5 Encourage non-nutritive sucking during gavage feeds. The infant sucks on a soother or cotton tipped adaptor dipped in breast milk or formula. Encourage kangaroo care during feeding. Refer to guideline: Skin to Skin / Kangaroo Care in Neonatal Units.

4.6 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.

4.7 Verify position of the gastric tube before each use (feeding or medication administration) by:
   4.7.1 Checking the insertion marking and
   4.7.2 Verifying gastric location with pH testing 5.5 or less (unless the baby is receiving acid suppressants). The appearance of feeding aspirates is insufficient in distinguishing between gastric fluids and respiratory secretions. Document the pH in the record. (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).

4.8 If gastric aspirate is not obtained follow the decision making and flow chart outlined in Appendix B.

4.9 Change nasogastric (NG) or orogastric (OG) PVC tubes every 72 hours and prn. 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.

4.10 Measure volume of aspirate if feeds are greater than 5 mL.
   4.10.1 If aspirate volume is less than 50% of previous feed:
      • Assess for signs of feeding intolerance, abdominal pathology
      • Discuss any abnormalities with physician
      • If normal assessment, re-feed aspirate and continue with feeding plan.
   4.10.2 If aspirate is stained with dark green bile with a pH greater than 6, fresh blood, or volume is greater than 50% of previous feed:
      • Assess for signs of feeding intolerance, abdominal pathology.
      • Notify physician and discuss feeding plan.

4.11 If aspirate is re-fed, do not count that volume in the feeding volume column.

4.12 If the volume of feeding is decreased, adjust IV fluids to make up the volume.

5.0 CONTINUOUS or INTERMITTENT PUMP FEEDING

5.1 To avoid increasing bacterial growth, administer the feed without pre-warming.

5.2 Visually assess feeding tube position every hour. Check tube position and measure gastric residuals (then re-feed them and document the pH) with each feeding time or q4h if continuous.

5.3 For pump feeding with syringe:
   • Use a new syringe for each feeding.
   • Use tubing for up to 24 hours - rinse the tubing with sterile water in between feeds if intermittent.

5.4 When using pump with bags (ie. kangaroo pump):
   • Rinse bag and tubing with sterile water every 4 hours.
   • Replace all bags and tubing every 24 hours.

5.5 Consider discontinuing feeding if there are any signs of respiratory distress or abdominal distension while investigations and assessment are completed and feeding plan discussed with physician.
5.6 If gastric residuals are greater than twice the hourly rate:
   - Assess for signs of feeding intolerance, abdominal pathology.
   - Discuss any abnormalities with physician.
   - If normal assessment, re-feed aspirate and maintain the same feeding rate.

5.7 To prevent tubing misconnections (enteral feeding to intravenous site):
   - Clearly label feeding pump as “enteral feeding only”. Use a unique pump if possible.
   - Use tubing, syringes or bags intended for enteral use only.
   - Clearly label syringe or bag with 2 patient identifiers and type of feeding contents.

6.0 SAFE INDIVIDUALIZED NIPPLE COMPETENCE (SINC)

6.1 Facilitate the first oral feed experience for the infant to be at the pumped breast if mom plans to breastfeed. This can occur even if the mother is not planning to breastfeed. Individualize this plan with the mom.

6.2 Implement the SINC protocol for infants born at less than 33 weeks gestation (see Appendix C). Assess infants once they are no longer requiring invasive ventilation, with or without non-invasive ventilation. Before beginning SINC level A assess for readiness cues including:
   6.2.1 Physiologic stability with normal care.
   6.2.2 Ability to swallow and manage oral secretions.
   6.2.3 Display of hunger cues when gently approached.

6.3 SINC level A success is considered when the baby demonstrates physiologic stability with latching and brief nonnutritive sucking (NNS) bursts on a dry soother (5 minutes) or pumped breast (5 minutes). This is done as standard for all babies.

6.4 SINC level B and C, also called “therapeutic tasting”, consists of drops of milk one at a time on a soother for 5 minutes, or at the breast (not pumped) for 10 minutes. If at the breast, provide the full volume of the feed by gavage.

6.5 SINC level D progresses to an open slow flow nipple, or 15 minutes at the breast. When using a nipple, keep the nipple half full. Do not progress past this stage if the baby is on non-invasive ventilation without further assessment.

6.6 SINC 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.

6.7 Advance through the stages when the infant has demonstrated successfully achieving the requirements of the stage in 9 of 12 or 6 of 8 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 in their current stage keep them at that stage. Consider a consult to Occupational Therapy if the infant is repeatedly unable to advance.

6.8 If the infant shows any signs of decompensation, apnea, bradycardia or desaturation, disinterest or disengagement, immediately stop the oral feeding and complete the feed by gavage, allowing the baby appropriate time to recover before proceeding to gavage.

6.9 Feed infants with only 2 modes at any feeding time. Ie. Breast/gavage, bottle/gavage or breast/bottle. Encourage breastfeeding as often as possible, as the more this is done at earlier stages the more likely to have long term success.

6.10 Support the baby when bottle feeding:
   6.10.1 Provide postural stability on pillow, side lying, bundled, hands midline.
   6.10.2 Promote oral organization with NNS prior to introduction of nipple.
   6.10.3 Use slow flow nipple.
6.11 When breastfeeding, assume the max volume for the stage based on assessment of milk transfer and mom’s report of the baby’s latch and suck. Consider test weights before and after feeds when baby has advanced to the later stages. Work closely with the mother to make a plan that supports breastfeeding skill development and mom’s own confidence.

7.0 SEMI-DEMAND / CUE BASED and AD LIB DEMAND FEEDING

7.1 Transition from SINC feeding to a semi-demand/cue based (See algorithm in Appendix D) approach when baby (born at less than 33 weeks) is successfully taking approximately 85% of feeding volume at 6 feedings per day. For babies 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.

7.2 Transition to ad lib demand (as much volume as they wish as often as they wish with no volume limit) if infant is:
   • gaining weight at a minimum of 10 gm/kg/day, and
   • 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
   • tolerating all feedings for at least 48 hours,

7.3 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.

7.4 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 regime if they have met all other discharge criteria. Provide parents with appropriate education materials and contact information for the Breastfeeding Service (if breastfeeding).

8.0 PRIMARY AUTHORS:

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8.4 Christine Froese, Occupational Therapist NICU HSC

9.0 REFERENCES:


### APPENDIX A

**Decision-making for feeding tube location and placement duration**

<table>
<thead>
<tr>
<th>Advantages</th>
<th>Nasal</th>
<th>Oral</th>
<th>Indwelling</th>
<th>Intermittent</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Does not interfere with breast or bottle feeds</td>
<td>Less traumatic insertion</td>
<td>Less frequent trauma / distress from insertion especially if infant has active gag or vagal reflex</td>
<td>Allows infant who is learning to feed to have no obstructions or irritants during oral feeding</td>
</tr>
<tr>
<td></td>
<td>Less impact on respiration</td>
<td></td>
<td>Less frequent trauma / distress from insertion especially if infant has active gag or vagal reflex</td>
<td>Infant looks more “normal” when tube not in place</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Limitations</th>
<th>Nasal</th>
<th>Oral</th>
<th>Indwelling</th>
<th>Intermittent</th>
</tr>
</thead>
<tbody>
<tr>
<td>May interfere with respiration</td>
<td>Cannot be used if infant has any nasal ventilation, CPAP or oxygen delivery</td>
<td>May interfere with oral breast or bottle feeding</td>
<td>May be a constant irritation to infant.</td>
<td>More frequent insertions may increase risk of trauma, oral aversion</td>
</tr>
<tr>
<td>May contribute to tracking of organisms into upper respiratory system and sinuses</td>
<td>May contribute to oral aversion</td>
<td>Easier for infant to dislodge</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**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

<table>
<thead>
<tr>
<th>Action</th>
<th>Rationale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Check for signs of tube displacement (if not initial insertion)</td>
<td>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.</td>
</tr>
<tr>
<td>Aspirate 0.2–1ml gastric fluid and apply to pH testing paper. Allow 10 to 15 seconds for any colour change</td>
<td>0.2 to 1ml of aspirate will cover an adequate area on single, double or triple reagent panels of pH testing paper. Note: extreme preterm infants may not produce enough gastric secretions to test. If that is the case see the last column.</td>
</tr>
<tr>
<td>Aspirate is pH 5.5 or below PROCEED TO FEED</td>
<td>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.</td>
</tr>
<tr>
<td>Aspirate is pH 6 or above</td>
<td>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:</td>
</tr>
<tr>
<td>• Consider replacing and/or re-passing the tube and re-aspirating.</td>
<td>• Is the baby on medication?</td>
</tr>
<tr>
<td>• If clinically safe, consider waiting 15–30 minutes before aspirating again.</td>
<td>• Is the baby only 24 to 48 hours old?</td>
</tr>
<tr>
<td>• If still pH 6 or above, seek advice from the Clinical Resource Nurse or charge nurse.</td>
<td>• Is the tube in the correct position?</td>
</tr>
<tr>
<td>Problems obtaining aspirate: Turn baby onto his/her side</td>
<td>• Is the visible length of the tube the same as previously documented?</td>
</tr>
<tr>
<td>Inject 1–2ml of air using a syringe</td>
<td>• What is the trend in pH values?</td>
</tr>
<tr>
<td><strong>This is NOT a testing procedure</strong></td>
<td>• What is the volume of aspirate?</td>
</tr>
<tr>
<td></td>
<td>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.</td>
</tr>
</tbody>
</table>

Problems obtaining aspirate: Turn baby onto his/her side

This may facilitate the tip of the gastric tube entering the gastric fluid pool.

Inject 1–2ml of air using a syringe

**This is NOT a testing procedure**

Injecting air through the tube may dislodge the exit-port of the feeding tube from the gastric mucosa. 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.
<table>
<thead>
<tr>
<th>Advance or retract the tube by 1–2 cm. Stop if there is any resistance or obstruction</th>
<th>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. Document the length of tube if moved.</th>
</tr>
</thead>
<tbody>
<tr>
<td>If you still cannot obtain aspirate</td>
<td>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. Record all decisions and their rationale. <em>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.</em></td>
</tr>
</tbody>
</table>
Check for signs of tube placement
Aspirate using syringe and gentle pressure

Aspirate not obtained

If possible, turn baby onto his/her side
Re-aspirate

Aspirate not obtained

Inject 1-2 mL of air into tube
Re-aspirate

Aspirate not obtained

Advance or retract tube 1-2 cm
Stop if any resistance
Re-aspirate

Aspirate not obtained

CAUTION: DO NOT FEED AND:
Consider replacing or re-passing tube
Seek senior advice
Consider x-ray if timely
Document decisions and rationale

pH 6.0 or greater
Proceed to feed

pH < 6.0
Proceed to feed

CAUTION: DO NOT FEED AND:
Consider waiting 15-30 minutes then re-aspirate
Consider replacing or re-passing tube
If pH still >6.0 seek senior advice about:
Medications
The tube – compare to previous x-ray
Feeding history
Balancing risks
Consider x-ray if timely
Document decisions and rationale
APPENDIX C

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)*

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APPENDIX D

Semi-Demand / Cue Based Feeding Algorithm

1. Assess feeding readiness at every Q3 (see bedside poster)
   - If ready breast or bottle
     - Guide feed by disengagement signs (see bedside poster)
       - If partial feed supplement based on baby’s weight gain and amount of remaining feed
       - If not ready offer breast or bottle
         - Guide by disengagement cues (see bedside poster)
           - If partial feed supplement based on baby’s weight gain and amount of remaining feed
   - If not ready allow to sleep for 30 minutes
     - Reassess feeding readiness (see bedside poster)
       - If not ready gavage

2. Tolerates full volume for all feeds for 24 hours
   - Remove NG Demand Feed