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# **Pediatric Dysphagia: Who's Ready, Who's at Risk, and How to Approach**

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# Disclosure Statement

We have no relevant financial or nonfinancial relationships to disclose.



# Objectives

Participants will be able to:

- Identify at least one strategy to utilize with children exhibiting food refusal behaviors.
- Identify safe and appropriate technique for feeding infant with cleft lip and palate.
- Identify the four goals for a successful feeding in the NICU population.
- Identify various feeding difficulties associated with cardiac and airway anomalies.



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# NICU Feeding



# Who's Ready?

- Increased early opportunities for oral feeding can lead to full oral feedings sooner (McCain & Gartside, 2002).
- Gestational age = 32-34 weeks
  - Preterm infants unable to coordinate suck-swallow-breathe prior to 32 weeks (Mizuno & Ueda, 2003).
  - Often not fully organized until 34 weeks.
- Behaviors or cues can be better indicators than age.
- Growing body of research correlates cue-based feeding and decreased time to full oral feedings in healthy preterm infants.



# What are the cues?

- **Physiological cues**
  - Tolerates full enteral feeds
  - Has a stable respiratory system
  - Tolerates gentle handling
  - Able to transition to an alert state
  - Has the ability to lick, nuzzle or suck non-nutritively
- **Behavioral cues**
  - Roots in response to touch around the mouth
  - Places hands to mouth
  - Lip smacking
  - Tongue protrusion
  - Searches for nipple when placed to breast



# Cue-Based Feeding

- A cue-based feeding model is an alternative to traditional medical models for feeding.
- Uses the infant's cues as a means to identify readiness to attempt oral feedings.
- Infant-Driven Feeding Scales (Ludwig & Waitzman, 2007)
  - An assessment, guide for intervention, and means of documentation for bottle feeding using a cue-based model.
  - Utilizes an objective scale for documenting behaviors related to feeding readiness, quality of nipping, and supportive techniques used.

# Infant-Driven Feeding Scales

## (Ludwig & Waitzman , 2007)

### A. Feeding Readiness Scale

- 1** – Drowsy, alert, fussy before care  
Rooting and/or bringing hands to mouth/  
taking pacifier  
Good tone
- 2** – Drowsy or alert once handled  
Some rooting or taking 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

### B. Quality of Nippling Scale

- 1** – Nipples with a strong coordinated suck throughout feed
- 2** - Nipples with a strong coordinated suck initially but fatigues with progression
- 3** – Nipples with consistent suck but has difficulty coordinating swallow, some loss of liquid or difficulty pacing, benefits from external pacing
- 4** – Nipples with a weak/inconsistent suck, little to no rhythm, may require some rest breaks
- 5** – Unable to coordinate suck-swallow-breathe pattern despite pacing, may result in frequent or significant A/Bs or large amounts of liquid loss and/or tachypnea significantly greater than baseline with feeding

### C. Caregiver Technique Scale

- A** – External pacing
- B** – Modified sidelying
- C** – Chin support
- D** – Cheek support
- E** – Oral stimulation



# A Philosophical Change

(Ludwig & Waitzman , 2007)

## Traditional Feedings

- Physician orders “p.o. feed every 3 hours, gavage remainder”
- Success measured by volume taken over time (30cc in 30 minutes)
- Documentation is subjective: “infant fed well, fair, poorly”
- Feeding techniques may be inconsistent across caregivers
- Infant is fed

## Infant-Driven Feedings

- Physician orders “initiate cue-based feeding”
- Success is measured by quality of feeding experience
- Documentation is objective: scale used to judge readiness, quality of nipping, supportive techniques
- Feeding techniques more easily communicated between caregivers
- Infant feeds



# Goals for a Successful Feeding (Ludwig & Waitzman, 2007)

1. Safe – minimize risk of aspiration
2. Functional – infant takes adequate quantity without force feeding
3. Nurturing – feeding time is a pleasant, relationship-based experience
4. Individually and Developmentally Appropriate – each infant is assessed for signs of readiness at each feeding



# Who's at Risk?

## When Feeding Specialists Should Get Involved

- Weak or absent non-nutritive suck at 32 weeks
- Lack of expected progress at 34 weeks
- Consistently scores 3, 4, 5 on Readiness Scale
- Difficulty coordinating suck-swallow-breathe
- Extreme hypersensitivity to touch/hypersensitive gag
- Oral stimulation or oral feedings that result in compromised vital signs
- Neurologically compromised infants
- Difficulty managing secretions
- Tracheostomy
- Craniofacial anomalies
- Absent or weak cry, known vocal fold abnormality, subglottic stenosis
- Noisy breathing or stridor



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# How to Approach....



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# Assessment

- Use Readiness Scale to rate overall tone and cues
- Assess Respiratory Status
- Oral Mechanism Examination
- Feeding Trial (if appropriate)



# Assessment Respiratory Status

- Respiratory rate
    - No greater than 60-70 bpm
  - Oxygen requirements
    - High flow nasal cannula
  - Episodes of desaturation
  - Nasal obstruction, congestion
  - Noisy breathing or stridor
- \* Breathing always takes precedence over feeding\***



# Assessment

## Oral Mechanism Exam

- Facial muscle tone
- Craniofacial anomalies
- Ankyloglossia
- Vocal quality
- Non-nutritive suck (NNS) on finger or pacifier
  - Does infant open to the finger/pacifier?
  - Are any aversion behaviors displayed?
  - Is suck weak or inconsistent?
  - If unable to elicit, recommend oral stimulation



# Assessment Feeding Trial

- If NNS is weak or inconsistent, start with pacifier dipped in milk/formula
- Trial slow flow nipple while observing for:
  - Suck-swallow-breathe coordination
  - Labial seal
  - Suck strength
  - Anterior spillage
  - Negative responses (aversion, gagging)
  - Physiological changes
  - Signs/symptoms of aspiration
- Utilize supportive techniques as indicated (Appendix B)





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# Supportive Techniques

## External Pacing

- Needed when an infant has difficulty coordinating suck-swallow-breathe or when overwhelmed by volume.
- Tip bottle downward to empty milk out of the nipple and back into the bottle. Keep nipple in mouth if possible. Allow time to breathe and/or swallow. May need to remove nipple if not recovering.



Photo: Stacy Kucharczk ([www.youtube.com](http://www.youtube.com))



# Supportive Techniques

## Modified Sidelying

- Imitates the breastfeeding position. Increases infant's control of the fluid and decreases choking.
- Infant is held in flexion on side with the head slightly higher than the feet.



Photo: Debra Beckman ([www.youtube.com](http://www.youtube.com))



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# Supportive Techniques

## Chin Support

- Stabilizes the mandible to prevent release of the nipple and encourages better stripping of the nipple. Inhibits jaw excursion.
- Caregiver's finger is placed under the chin and provides firm upward pressure.



Photo: [www.about.premies.com](http://www.about.premies.com)



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# Supportive Techniques

## Cheek Support

- Improves suction and pressure by decreasing intraoral space.
- Caregiver places fingers on outside of cheeks and applies firm inward pressure. May be done unilaterally or bilaterally.



Photo: [www.talk-ds.org](http://www.talk-ds.org)



# Instrumentation Assessment

- In order to limit radiation exposure, videofluoroscopic swallow studies (VFSS) should be recommended with caution and only when felt to be absolutely necessary.
- Work with decreasing nipple flow and supportive techniques first.
- Fiberoptic Endoscopic Evaluation of Swallow (FEES) is an alternative.



# The Thickening Controversy

- Thickening is a common “go-to” strategy for decreasing aspiration risk and slowing flow rate of liquid.
- However, there are many contraindications for thickening that need to be considered:
  - Gastric complications
  - Changes in dietary composition
  - Viscosity inconsistencies (Stuart, 2009)
  - Challenges of thickening breast milk
  - Potential variation in preparation between caregivers
- The decision to thicken should be made only after positioning and/or slower flow nipples have been unsuccessful or aspiration risk is confirmed or felt to be too high.
- Medical team, including physicians and nutritionists, should work together to determine the best method for thickening for each infant on a case-by-case basis.



# Nipple Flow Rates

## Jackman (2013)

- There is wide variation in flow rates between commercial nipples, as well as between commercial nipples and disposable nipples used in NICUs.
- Jackman tested 20 commercial nipples and 6 hospital disposable nipples using a breast pump as the source of suction and found:
  - Disposable nipples have more variability in flow rate between units and trials.
  - Several commercially available nipples have slower flow rates than disposable nipples.
  - Commercially available nipples marketed as “slow flow” have a wide variety of flow rates.
  - See Appendix C for complete list of nipples and results.



# What about Breastfeeding?

- Does a baby need to be “proven” safe or efficient on the bottle before being allowed to nurse? Not necessarily.
- Several studies have suggested that the swallowing physiology during breastfeeding is unique and may better protect an infant’s airway:
  - Slower pace of intake associated with breastfeeding allows for better integration of breathing and swallowing (Furman & Minich, 2004).
  - Sucking during bottle feedings interrupts breathing more frequently and for more sustained durations than during breastfeeding (Miller & DiFiore, 1995).
  - Swallowing during breastfeeding occurs at specific points between breaths (Goldfield et al 2006).
  - During breastfeeding, infants may manipulate sucking parameters to better control milk flow and accommodate breathing in a way that reduces apnea, bradycardia, and fatigue (Meier 2001).





# Follow-Up

- Infant should be seen for outpatient follow-up when:
  - Goes home with NG- or G-tube taking <50% of feedings orally.
  - Does not steadily increase volume of oral feedings.
  - Continues to require multiple supportive techniques for successful oral feedings.
  - Takes longer than 30 minutes to finish feeding and has less-than-satisfactory weight gain.
  - Begins to demonstrate new aversion behaviors to oral feeding.



# Takeaways

- Infant-driven cue-based feedings can provide infants with more positive and safer feeding experiences and can lead to full oral feedings more quickly.
- Supportive feeding techniques and adjusting nipple flow are first-step approaches to feeding therapy in the NICU.
- VFSS should be recommended conservatively.
- Thickening should be recommended cautiously and decisions regarding the type of thickener used should be made as a medical team.
- An infant's swallowing may be "safer" with breastfeeding than bottle feeding, and each modality should be assessed independently.



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# Cardiac Anomalies



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# Congenital Heart Disease (CHD)

- The relationship between the respiratory and cardiac systems is reciprocal. Increases in cardiac demands cause an increase in the work load to breathe (Hall, 2001)
- Estimated incidence of dysphagia varies depending on the risk factors including preoperative acuity, duration of intubation, nature of CHD, vocal cord injury, weight characteristics or type of surgical procedures (Jadcherla et al, 2009)

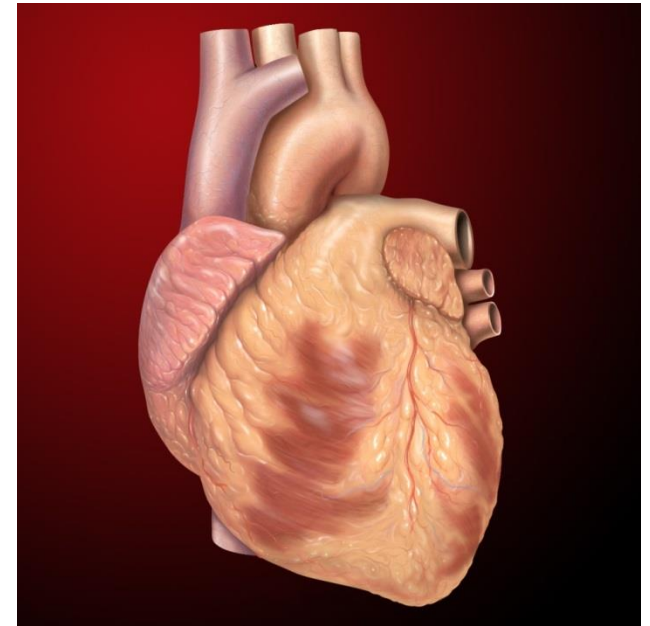


# Who's at Risk?

## Common Cardiac Diagnoses

(American Heart Association, 2016)

- Atrial septal defect (ASD)
- Ventricular septal defect (VSD)
- Patent ductus arteriosus (PDA)
- Tetralogy of Fallot (ToF)
- Coarctation of the Aorta
- Pulmonary valve stenosis
- Hypoplastic left heart syndrome (HLHS)





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# Who's at Risk?

## Syndromes Associated with CHD

- Trisomy 21
- Trisomy 18
- Trisomy 13
- 22q11/DiGeorge syndrome
- Turner syndrome
- Williams syndrome



# The Norwood Procedure

- Laryngopharyngeal dysfunction is reported after Norwood procedure in about 48% of patients, and these effects are characterized as dysphagia, aspiration, and left recurrent laryngeal nerve injury (Skinner et al, 2005)
- Alternatively, feeding difficulties can also be due to respiratory compromise or due to vocal cord paralysis or may follow underlying neurological sequelae (Jadcherla, 2009)





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# Associated Feeding/Swallowing Problems

- **Decreased endurance**
- Poor coordination of the suck-swallow-breathe pattern
- Increased work of breathing with feedings
- Aspiration



# Who's Ready?

## Clinical Feeding/Swallow Evaluation

- Oxygen needs
- Respiratory rate/work of breathing
- Non-nutritive sucking
- Nutritive sucking
- Signs and symptoms of aspiration
- Vocal quality





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# Further Evaluation

- Videofluoroscopic swallow study
- FEES





# How to Approach? Treatment

- Oral stimulation
- Increase the nipple flow rate
  - Do it safely!
- More frequent breaks
- Orally feeding every other feeding time
- Chin and cheek support
- Regular follow-up after initial evaluation
- Outpatient feeding therapy if needed after discharge from the hospital



# The research tell us...

## (Jadcherla et al, 2009)

- Acyanotic vs. cyanotic
- In contrast to neonates with acyanotic CHD, cyanotic CHD group had significant delays with (a) feeding readiness, (b) successful gastric feeding, (c) oromotor readiness and (d) successful oromotor skills
- Co-morbid factors that may directly influence the delay in feeding milestones include the (a) duration of respiratory support and (b) use of cardiopulmonary bypass
- Delays in achieving maximum gavage and maximum nipple may suggest foregut dysmotility and oropharyngeal phase dysphagia



# In summary...

- Estimated incidence of dysphagia varies depending on the risk factors including preoperative acuity, duration of intubation, nature of CHD, vocal cord injury, weight characteristics or type of surgical procedures
- Associated feeding problems with CHD include decreased endurance, poor coordination of the suck-swallow-breathe pattern, increased work of breathing with feedings, aspiration
- Further evaluation of the swallow may be necessary
- Various supportive techniques can be used to assist the infant when orally feeding



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# Airway Anomalies



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# Who's at Risk? Airway Anomalies

- Tracheomalacia
- Bronchomalacia
- Laryngomalacia
- Subglottic stenosis
- Bronchopulmonary dysplasia
- Laryngeal cleft
- Tracheoesophageal fistula
- Vocal fold paralysis





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# Surgeries

- Laryngotracheal Reconstruction
- Cricoid Tracheal Resection
- Supraglottoplasty
- Laryngeal cleft repair



# The research tells us...

## (Miller et al, 2009)

- Patients who undergo open airway surgeries are likely to experience some degree of pediatric dysphagia
- Children undergoing LTR procedures are likely to experience some level of dysphagia in the post-operative period. The severity of dysphagia is increased in association with posterior grafts, staged procedures, and with airway reconstruction procedures that address multiple levels of stenosis (supraglottic, glottic and subglottic) simultaneously
- Post-operative feeding difficulty occurred in patients with pre-existing feeding issues such as oral aversion and/or texture resistance regardless of reconstructive surgical procedure type



# Tracheostomy

- Some infants and children with upper airway obstruction or other pulmonary complications require a tracheostomy
- Some of these infants and children, but not all, will require ventilator support as well





# Tracheostomy and Swallowing (Swigert, 1998)

- Clinically, some specific effects on swallowing are observed:
  - disordered abductor and adductor laryngeal reflexes
  - desensitization of the oropharynx and larynx as a result of airflow diversion through the tracheotomy tube
  - reduced effectiveness of the cough reflex to clear accumulated supraglottic secretions
  - reduced subglottal air pressure
  - diffuse atrophy of the laryngeal muscles
- Overall, it has been discussed that aspiration more often occurs due to the medical status of the patient rather than to the presence of the tracheotomy tube itself



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# Who's Ready and How Do We Approach?

- Complete clinical feeding/swallow evaluation as highlighted earlier
- Keep feeding and swallowing implications specific to airway anomalies in mind during evaluation
- Videofluoroscopic swallow study or FEES if indicated



# “Blue Dye” Test

- First feeding and swallowing evaluation completed after surgery – following first trach change
- The adding of blue food coloring to more easily detect aspiration within suctioned secretions
- Results of the "blue dye" test have been shown to be inconsistent when compared with findings of both videofluoroscopic and FEES evaluations
- Therefore, the "blue dye" test (including colored foods) may be best viewed as a screening tool (Suiter et al, 2016)
- “Blue dye” test is not always sensitive to trace aspiration (Donzelli et al, 2001)



# In summary...

- Patients who undergo open airway surgeries are likely to experience some degree of pediatric dysphagia
- In the research, post-operative feeding difficulty occurred in patients with pre-existing feeding issues such as oral aversion and/or texture resistance regardless of reconstructive surgical procedure type
- A tracheostomy does have clinical effects on swallowing. However, aspiration more often occurs due to the medical status of the patient rather than to the presence of the tracheotomy tube itself
- Blue dye test should be used as a screening tool and is not sensitive to trace aspiration



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- Images:
  - <http://www.trachoestomy.com> (tracheostomy)
  - <https://en.wikipedia.org/wiki/Heart> (heart)
  - <http://www.friscokidsdds.com/dental-topics/dental-library/baby-bottle-tooth-decay/> (baby drinking bottle)
  - <http://www.refluxrebels.com/acid-reflux-tests-in-infants/> (VFSS picture)





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# Feeding the Infant with Cleft Lip and Palate





# Anatomy

- Cleft lip (CL) and palate result from developmental variations that occur during the embryonic period (four to eight weeks), as well as the early fetal period (nine weeks and beyond).
  - Primary Palate: forms the upper lip, alveolar ridge, and the anterior portion of the maxilla (Premaxilla, Prolabium).
    - Formation takes place in sixth week after conception.
  - Secondary Palate: formed by the fusion of the palatine processes, which then fuse with the premaxillary structures, the nasal septum, and the vomer bone.
    - Complete by 10-12 week mark.



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# Various Types



normal lip



normal palate



cleft palate



left unilateral cleft lip



left cleft lip



left unilateral cleft lip and palate



bilateral cleft lip and palate



bilateral cleft lip



bilateral cleft lip with full palate



# Who Needs Specialty Bottles?

- Typically, infants with CL only can eat with standard bottles and/or breast feed.
- Infants with complete cleft (soft and hard palate involved) require specialty feeder.
- Infants with cleft of only the soft palate sometimes feed with standard nipple, but evaluation is warranted to assure this is the most efficient way to feed.



# Why Do We Need Specialty Feeders?

- Infants with cleft palate cannot close off mouth from nose, therefore they are unable to create the suction required to move liquid from bottle or breast.
- Specialty feeders offer the most efficient way for infants with cleft palate to eat without over expenditure of calories during the feeding process. Infants can use those calories for growth and nourishment.



# What Kind of Specialty Feeders are Available?

- Caregiver squeeze assist options:
  - Mead Johnson Cleft Palate Nurser
  - Haberman Feeder





# Mead Johnson Cleft Palate Nurser

- Squeeze assist bottle: entire body of bottle is the squeezable portion.
- Long nipple extends past the cleft.
  - Babies gag with this nipple.
  - Utilize an orthodontic nipple with this bottle.





# Haberman Feeder

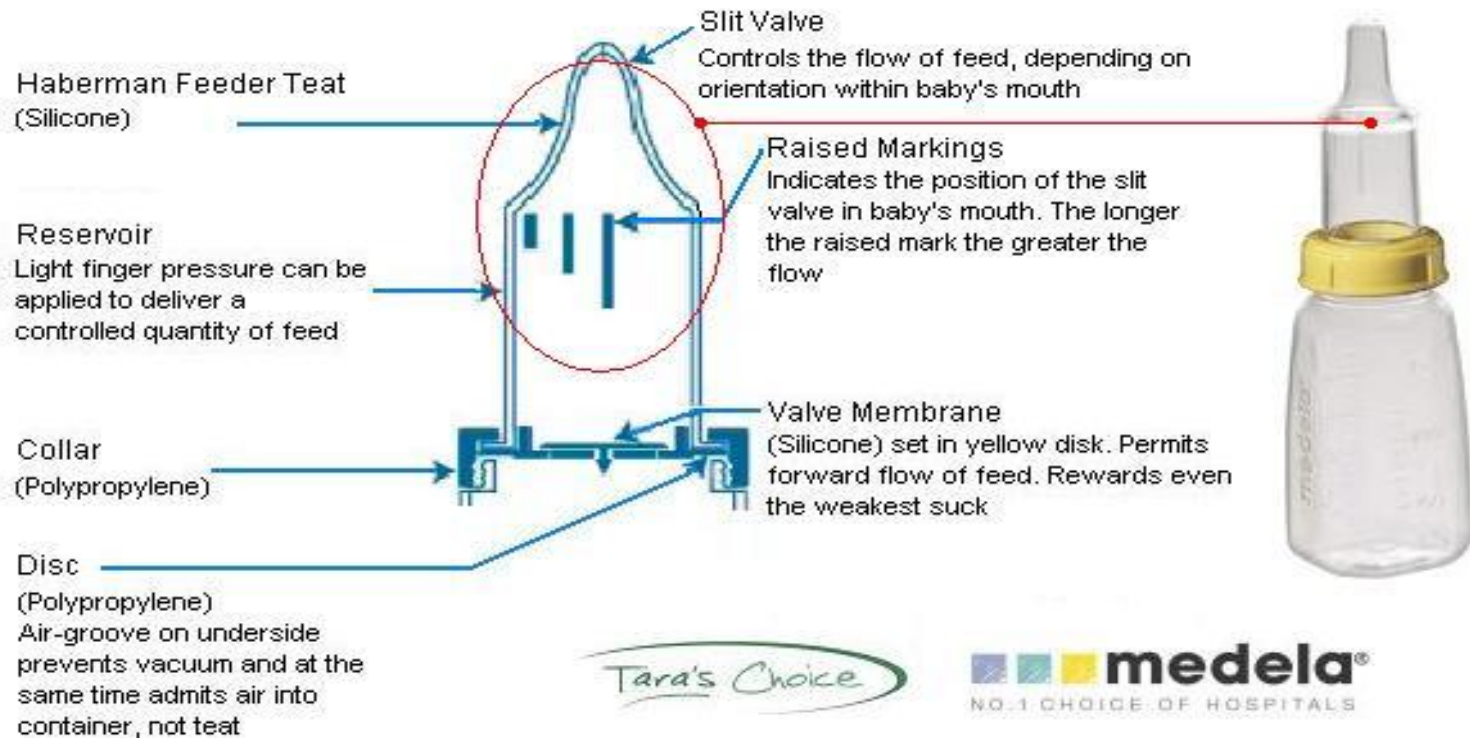
- Squeeze assist feeder: nipple is the squeeze assist portion.
  - Fill nipple prior to feeding.
  - Liquid will be pulled from bottle to nipple as feeding progresses.
  - Three flow settings are built into bottle.





# Haberman Feeder

## The Haberman feeder - How it works



*Tara's Choice*

**medela**  
NO. 1 CHOICE OF HOSPITALS



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# What Kind of Specialty Feeders are Available?

- Infant driven squeeze assist option:
  - Dr. Brown Specialty Feeding System





# Dr. Brown Specialty Feeding System

- Infant driven squeeze assist: caregiver does not have to provide the squeeze assist.
- Infant expresses the liquid when manipulating nipple with tongue, lips, gums, and mandible during suck bursts.





# Pros and Cons

Type	Pros	Cons
Mead Johnson	<ul style="list-style-type: none"><li>• Inexpensive</li><li>• Large quantities</li><li>• Minimal pieces</li></ul>	<ul style="list-style-type: none"><li>• Needs replacing frequently</li><li>• More pressure required</li><li>• Looks different than standard bottle</li><li>• Requires practice/training</li></ul>
Haberman	<ul style="list-style-type: none"><li>• Good quality</li><li>• Different flows built into bottle</li><li>• Easy to squeeze</li></ul>	<ul style="list-style-type: none"><li>• Expensive</li><li>• Multiple pieces</li><li>• Looks different than standard bottle</li><li>• Requires practice/training</li></ul>
Dr. Brown	<ul style="list-style-type: none"><li>• Good quality</li><li>• Looks like standard bottle</li><li>• Easy to have others feed baby</li><li>• Multiple flow nipple options: Ultra Preemie to Level 4</li></ul>	<ul style="list-style-type: none"><li>• Multiple pieces to assemble</li></ul>



# Caregiver Squeeze Assist

## How to use Specialty Feeders

- Squeeze assist bottles: When infant is actively engaged in feeding (attempting to produce suck bursts on nipple), caregiver provides gentle squeeze assist every 1-3 suck bursts.
- Squeeze assist is NOT constant pressure, but rather follows the infant's natural rhythm of suck burst.
- Important to keep in mind that this will take practice and training in order for parents to feel comfortable.



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# Infant driven squeeze assist

- Infant driven squeeze assist: Place nipple in infant's mouth and assess for tolerance of flow.

# Who's Ready vs. Who's At Risk?

- Non-syndromic Cleft Lip and Palate
  - Isolated cleft lip and palate minimal to moderate effect on feeding success
  - At no higher risk for aspiration than infant with intact oral structures
  - Severity of the cleft will impact feeding success
  - SLP to assess and implement feeding interventions soon after birth
- Cleft Lip and Palate with Associated Syndrome
  - Additional structural, airway, and neuromotor issues present
  - Inefficient oral phase paired with other issues
  - Ongoing feeding and swallowing issues requiring input from SLP

# How to Approach

- Perform your standard clinical swallow evaluation.
- Observe caregiver feeding infant.
- Careful reading of infant during feeding to assess if baby is overwhelmed by flow or working too hard for feed is vital.

## Questions to include on Intake:

How long does a typical feeding take from start to finish?

Do you notice any coughing during feeds?

What position is infant in for feedings?

Is infant gaining weight appropriately?

What bottle system are you currently using? Are you attempting breast feeding?

How often are you burping infant?

Are you comfortable with the bottle system you are using?

How often is infant eating?





# Things to Keep in Mind for Cleft Lip and Palate Population

- Study of feeding infants with nonsyndromic cleft palate:
  - *Shorter suck bursts*
  - *Faster rate of sucking*
  - *Higher suck-swallow ratios\**
    - Will require more frequent burping

Masarei, et al., 2007



# How to Approach?

- Infant is overwhelmed by flow and/or rate of squeeze assist.
  - Anterior spillage.
  - Coughing/sputtering during feed.
  - Back off squeeze assist rate (offer every 2-3 suck bursts) or pressure.
  - Change nipple flow.
- Infant is working too hard for feed.
  - Inadequate weight gain.
  - Infant taking longer than 20-30 minutes to complete a feed.
  - Falling asleep during feed/waking and cueing to eat frequently.
  - Increase squeeze assist rate and/or pressure.
  - Attempt a faster flow nipple.



# Guidelines for Successful Feed

- Infant ideally should be awake, alert, and cueing for feed.
- Place in semi-upright, supported position.
  - Provides excellent view of baby for better control of squeeze assist.
  - Helps prevent nasal regurgitation.
- Follow infant's cues for when to provide squeeze assist.
  - Do not force feed.



# Guidelines for Successful Feed

- More frequent burping required.
  - Every 15mL or if presenting with signs.
- Feedings should last no longer than 30 minutes.
  - If more time is spent than 30 minutes on feed, all caloric value goes to energy expended on feed rather than growth and nourishment.



# NOTE

- DO NOT CUT NIPPLES OF ANY SPECIALTY FEEDER!
- Many times we see caregivers who have cut the nipples of specialty feeders in an attempt to increase flow.
- Often will result in baby being totally overwhelmed by flow of liquid, placing them at higher risk for aspiration.
- Will at times defeat the purpose of the specialty feeder.
- If a specialty feeder is not working for a baby, change nipple flow or try alternative specialty feeding system.



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# Parent Education

- [www.cleftline.org](http://www.cleftline.org)
- Videos for use of each bottle system.
- Additional information on purchasing (with links) each bottle system.



# Breast Feeding in Cleft Lip and Palate

- Be sensitive to mother's desire to breast feed.
- Lactation should also be consulted for further discussion on putting baby to breast, further assessment of effective breast feeding in infant, and information on pumping.
- Cleft lip only and sometimes cleft of only the soft palate will be successful in breast feeding.
- Encourage mother to put baby to breast for ~10 minutes after a feed for mother baby bonding if desired.



# Timing of Surgical Repairs

- Differs per center and specialist, but in general:
  - Age 3 months: Repair of cleft lip.
  - Age 9-12 months: Repair of cleft palate (may have pre-linguistics screening with SLP around this time to determine development and readiness for repair of the cleft; generally timed with development of babble/first words).





# Transition to Spoon Foods

- When?
  - Typical time that you would introduce foods to any baby: 4-6 months with pediatrician approval.
  - Main issue will be food entering the nasal cavity.
    - May be uncomfortable but not life threatening.
    - Offer smaller bites.
    - Slow the pace of offering feeds.
    - Often, nasal regurgitation will reduce/disappear within ~one week as they become accustomed and learn to move their tongue in a way that controls the bolus.



# Nasoalveolar Molding (NAM)

- Orthodontic device placed in oral cavity to help improve shape and position of nose.
- Presurgical management intended to reduce the severity of the oronasal deformity.
- Implications for feeding in infants
  - Potential to improve feeding, but not to the point of standard bottle use
  - Should not inhibit feeds



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- Images
  - <http://kidshealth.org/en/teens/cleft.html> (cleft lip and palate images)
  - <https://www.clapa.com/treatment/feeding/bottles-teats/> (infant feeding with Haberman, title page)



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# Behavioral Considerations

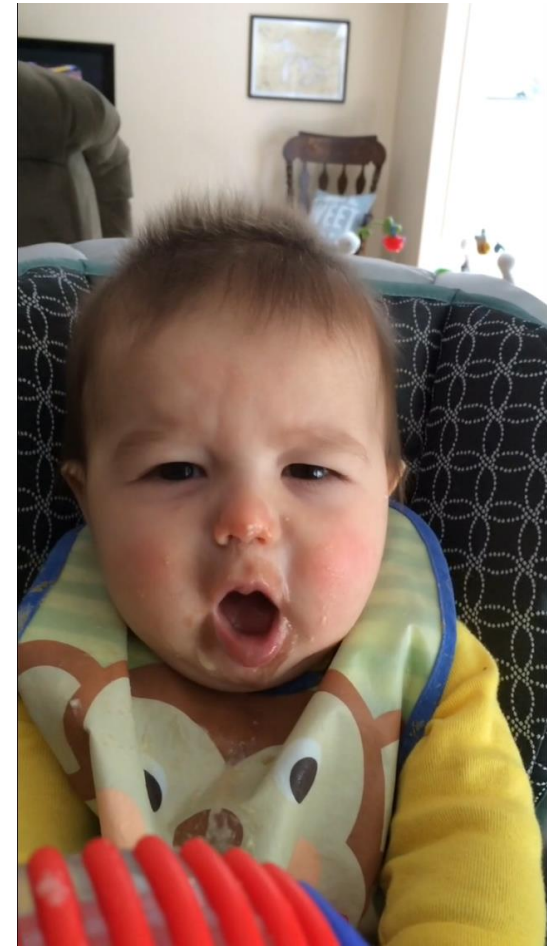




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# What's Normal?

- All children go through phases of learning oral motor movements, eating preferred foods, and inconsistent patterns
- Not necessarily a dysphagia





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Age (months)	Feeding/oral sensorimotor
Birth to 4–6	Nipple feeding, breast, or bottle Hand on bottle during feeding (2–4 months) Maintains semiflexed posture during feeding Promotion of infant–parent interaction
6–9 (transition feeding)	Feeding more upright position Spoon feeding for thin, smooth puree Suckle pattern initially Suckle suck Both hands to hold bottle Finger feeding introduced Vertical munching of easily dissolvable solids Preference for parents to feed
9–12	Cup drinking Eats lumpy, mashed food Finger feeding for easily dissolvable solids Chewing includes rotary jaw action
12–18	Self-feeding: grasps spoon with whole hand Holding cup with 2 hands Drinking with 4–5 consecutive swallows Holding and tipping bottle
18–24	Swallowing with lip closure Self-feeding predominates Chewing broad range of food Up–down tongue movements precise
24–36	Circulatory jaw rotations Chewing with lips closed One-handed cup holding and open cup drinking with no spilling Using fingers to fill spoon Eating wide range of solid food Total self-feeding, using fork

(Arvedson: 2006; Appendix E)



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# Who's At Risk to develop feeding difficulties?

- Children with complex medical history
- History of tube feedings
- Developmental Delay
- Traumatic event
- Some typically developing children



# In the Literature

- 85% of feeding problems are caused by a combination of medical, developmental, & behavioral factors (Burklow, Phelps, Schultz, McConnell, & Rudolph, 1998)
- Multidisciplinary approach to nonorganic failure to thrive has been found to result in significantly faster **weight gain** (Bithoney, McJunkin, Michalek, Snyder, Egan, & Epstein, 1991)





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# SLP & Behavioral Psychology

- Interdisciplinary model to comprehensively assess and differentiate between oral motor difficulties, dysphagia, and behavioral concerns.
- For treatment, helpful in creating systematic approach that can break feeding down into smaller, more attainable components.
- Individualized to each child.



# Interdisciplinary model, continued

- Dietician
  - Increasing caloric density
    - Dietary restrictions
  - Fluid intake recommendations
    - Daily requirements
  - Identifying malnutrition
  - Feeding schedules
- Physicians
  - Medical issues impacting feeding: GI symptoms, constipation, sleep issues, mucous



# How to Approach feeding?

- Initial treatment for any feeding problem
  - Quality, not quantity
  - 1<sup>st</sup> step: must learn to accept and swallow a bite quickly and nonviolently when it is presented
- Throughout treatment use positive reinforcements (may be non-traditional)
  - Escape extinction
- Often use timer to help pace session



# Rewards!

- Timer/play breaks
- Star charts
- Tokens
- Music
- Bubbles
- Tablet apps and/or videos
  - Continuous play for distraction
  - As a reward for each bite
- Anything known to be motivating for that child
  - Some children will have very specific interests-feel free to think outside the box!



# Smooth Purees

- Non-removal of spoon (NRS) until accepted
  - Batting, head turning
- Shape proper oral motor behaviors
  - After NRS desired behavior occurred
    - Dry spoon
    - Lip closure around spoon
    - Spoon dipped in puree; swallow without spitting
    - Gradually, and systematically increase bolus size
    - Gradually increase amount of puree required at each sitting



# Increasing Texture (Pre-Chewing)

- Gradually thickened smooth purees
  - Mixed in finely crushed Gerber puffs
- Gradually add more & increased size of lumps
  - Stage 3 foods
  - Pieces of Gerber Puff
- Re-presentation if expelled
- Ignore undesired behaviors (yelling, gagging, etc.)



# Pre-Chewing Tasks

- Nuk touch teeth, inside cheeks, lingual surface
  - NRS
  - Gag desensitization
- Lingual range of motion
  - Jaw stabilization
  - Purees to inside of cheeks
  - Vary textures, temperature, tastes (Arvedson 2014).
- Tolerate pieces of dissolvable in all parts of mouth without expulsion
- Can teach child to bite down on Nuk an increasing number of times



# Transitioning to Mastication

- Remember to note positioning, sensory aspects, presentation, texture, and movement patterns.
  - Start with small, consistent bite size and gradually increase
  - Avoid only offering dissolvable solids
  - When working on soft solids, watch for hyposensitivity





# Teaching To Drink

- Could start with water or clears
  - Spoon first
  - Open cup, noney cup
  - Honey bear, straw, 1-way valve
    - Aimed at cheek
    - Gradually move to midline
    - Control bolus size-make predictable
  - Thicken liquid to improve oral control and gradually thin out over time
- Have a plan to systematically introduce liquids, progress, and continue with reinforcement



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# Liquids continued

- Introduce formula/milk
  - May need to be gradual
  - Juice/flavor enhancers
  - Fade thickener if needed
  - Alternate methods to present liquids



# Preparing to For Weans

- Whether tube feeds or dependence on oral fluids, dependence on bottle, etc. for kids with feeding disorders:
  - Have to have skills to replace calories given via tube
  - Have to take calories in timely, cooperative manner



# Eliminating Tube Feeds

- Introduce mashed table foods for increased caloric density
- Ensured generalization of gains in foods and fluids to all caregivers
- Consult with dietitian on fluid goals, calorie goals, weight goals, sodium intake, replacement of nutrition from formula with table foods
- Approval and close monitoring from physicians
- Can continue to work on progressing oral feeding abilities



# References

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- [www.feedingmatters.org](http://www.feedingmatters.org)

Image: <http://www.texaschildrensblog.org/2015/01/behavioral-guidelines-for-stubborn-preschool-food-refusal-a-reward-plan-for-trying-new-foods/>