



Pediatric Dysphagia: Assessment & Treatment of Infant Feeding & Swallowing MSHA 2024

Jennifer C. Hall, MA CCC-SLP

HELEN DEVOS CHILDREN'S HOSPITAL

Disclosures

Relevant Financial Disclosures: None

Relevant Non-Financial Disclosures: None

How Did I Get Here?

*I attended Western Michigan University for undergraduate and graduate school

*Completed my CFY and continued my employment at Holland Hospital (adult inpatient/outpatient, home health, nursing home, outpatient peds, inpatient special care nursery)

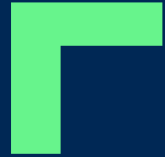
*In-home pediatrics

*Helen DeVos Children's Hospital Inpatient 2012 – current



What's the Scope of This Lecture?

- 1. We will review developmentally normal infant feeding and swallowing (0-12 months) in order to establish a foundation for assessment and treatment of infant dysphagia and feeding difficulties.**
- 2. We will learn how to assess and treat infant dysphagia and feeding difficulties among common populations (ie, pre-term, craniofacial, cardiac, etc).**
- 3. We will identify resources to support ongoing education among the pediatric dysphagia population.**



Why Is This Important?



Follow the Research

0.4%

A recent 2023 article from *Language, Speech, and Hearing Services in Schools*, "Pediatric Dysphagia: A Look Into the Training Received During Graduate Speech-Language Pathology Programs to Support This Population," revealed that less than 1% (0.4%) of academic courses analyzed were categorized as pediatric feeding and swallowing.

Why Is This A Problem?

***As medical technology and advancements in treatment progress, the survival rate among pre-term infants and infants with complex medical diagnoses continues to increase.**

***Speech-language pathologists will be required to perform informed pediatric dysphagia and feeding services to these growing populations.**

What Does ASHA Say?

"Experience in adult swallowing disorders does not qualify an individual to provide swallowing assessment and intervention for children. Understanding adult anatomy and physiology of the swallow provides a basis for understanding dysphagia in children, but SLP's require knowledge and skills specific to pediatric populations. As indicated in the ASHA Code of Ethics (ASHA, 2023), SLP's who serve a pediatric population should be educated and appropriately trained to do so."

(asha.org)

Feeding & Swallowing: What's the Difference? Corewell Health™

"**FEEDING** is the process involving any aspect of eating or drinking, including gathering and preparing food or liquid for intake, sucking or chewing and swallowing (Arvedson & Brodsky 2002). Feeding provides children and caregivers with opportunities for communication and social experiences that form the basis for future interactions (Lefton-Greif, 2008)."

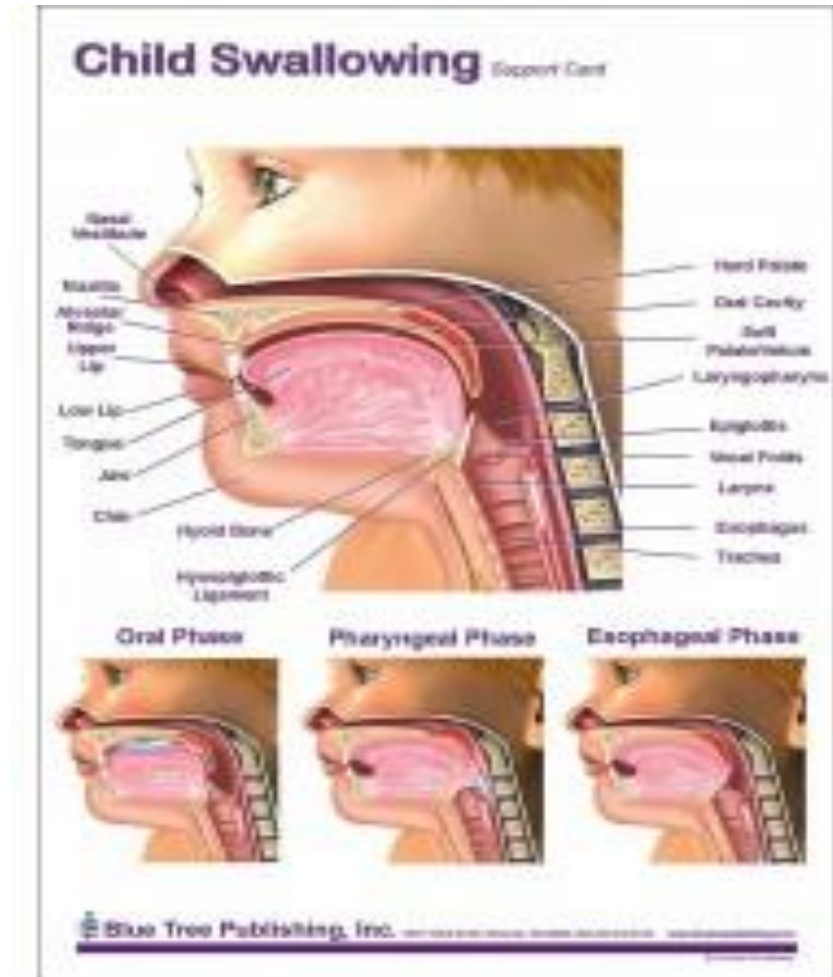
(asha.org)



Feeding & Swallowing: What's the Difference? Corewell Health™

"**SWALLOWING** is a complex process during which saliva, liquids, and foods are transported from the mouth into the stomach while keeping the airway protected. Swallowing is commonly divided into the following four phases (Arvedson & Brodsky, 2002; Logemann, 1998): oral preparatory, oral transit, pharyngeal, esophageal."

(asha.org)



Feeding & Swallowing: What's the Difference? Corewell Health™

"**FEEDING** is the process involving any aspect of eating or drinking, including gathering and preparing food and liquid for intake, sucking or chewing, and swallowing."

(Arvendson & Brodsky, 2002)



Feeding Disorders

1. Problems with eating and drinking activities that may or may not include difficulty with swallowing.

2. Pediatric Feeding Disorder (PDF) is "impaired oral intake that is not age-appropriate and is associated with medical, nutritional, feeding skill, and/or psychosocial dysfunction" (Goday et al., 2019).

3. PDF can be characterized by one or more of the following (Arvedson, 2008): refusing developmentally appropriate food/liquids; limited food repertoire; inappropriate or disruptive mealtime behaviors; failing to master self-feeding skills; failure to use appropriate utensils/feeding devices; failure to achieve optimal growth (asha.org)

Swallowing Disorders

- 1. Can occur in one or more phases of swallowing**
- 2. Can result in aspiration**
- 3. Can result in retrograde flow of food/liquid into the nasal cavity**
- 4. Long-term consequences may include: oral aversion, failure to thrive (FTT), aspiration PNA, GI concerns, need for enteral/parenteral nutrition, psychosocial effects on person and their family members**

Populations/Diagnoses Served

Abuse/neglect (ie, limited interaction with environment; paucity of resources)

Autism (ie, communication, picky eaters)

Cardiac anomalies (ie, "hole" in the heart, underdeveloped heart, abnormally developed heart)

Cleft lip/palate

Craniofacial anomalies (ie, Pierre Robin Syndrome)

Developmental delay

Head trauma (ie, concussion, TBI)

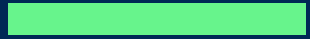
Neurologic disease/dysfunction (ie, brain infections, brain tumors, hypoxia, overdose, stroke)

Non-accidental trauma

Prematurity (ie, communication delays, dysphagia)

Respiratory Compromise (ie, tracheostomy, artificial ventilation)

01



First things first...

Embryologic Development



Embryologic Development Where Do Things Go Wrong?

- Cleft Lip & Palate (Weeks 7-8 of gestation)
 - Unilateral cleft lip
 - Unilateral cleft lip and palate
 - Bilateral cleft lip and palate
 - Cleft soft palate
 - Submucous cleft

Cleft Lip & Palate



Embryologic Development Where Do Things Go Wrong?

- Gastrointestinal Tract Abnormalities (Weeks 3-8 of gestation)
 - Esophageal atresia (most common malformation of the esophagus)
 - Diaphragmatic hernia
 - Heterotaxy
 - Pyloric Stenosis (overgrowth of the longitudinal muscle fibers of the pylorus)
 - Omphalocele

Types of Esophageal Atresia

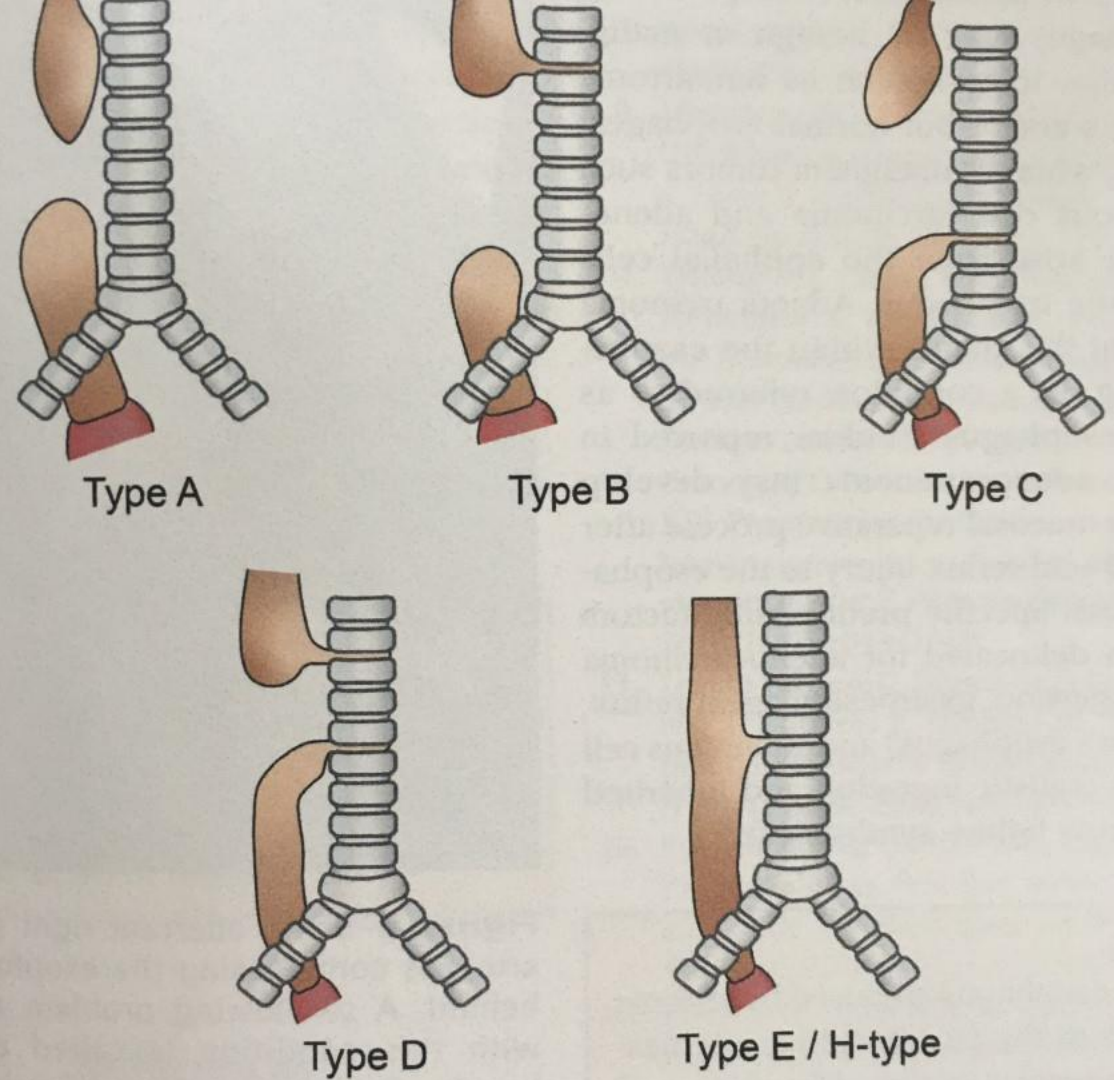
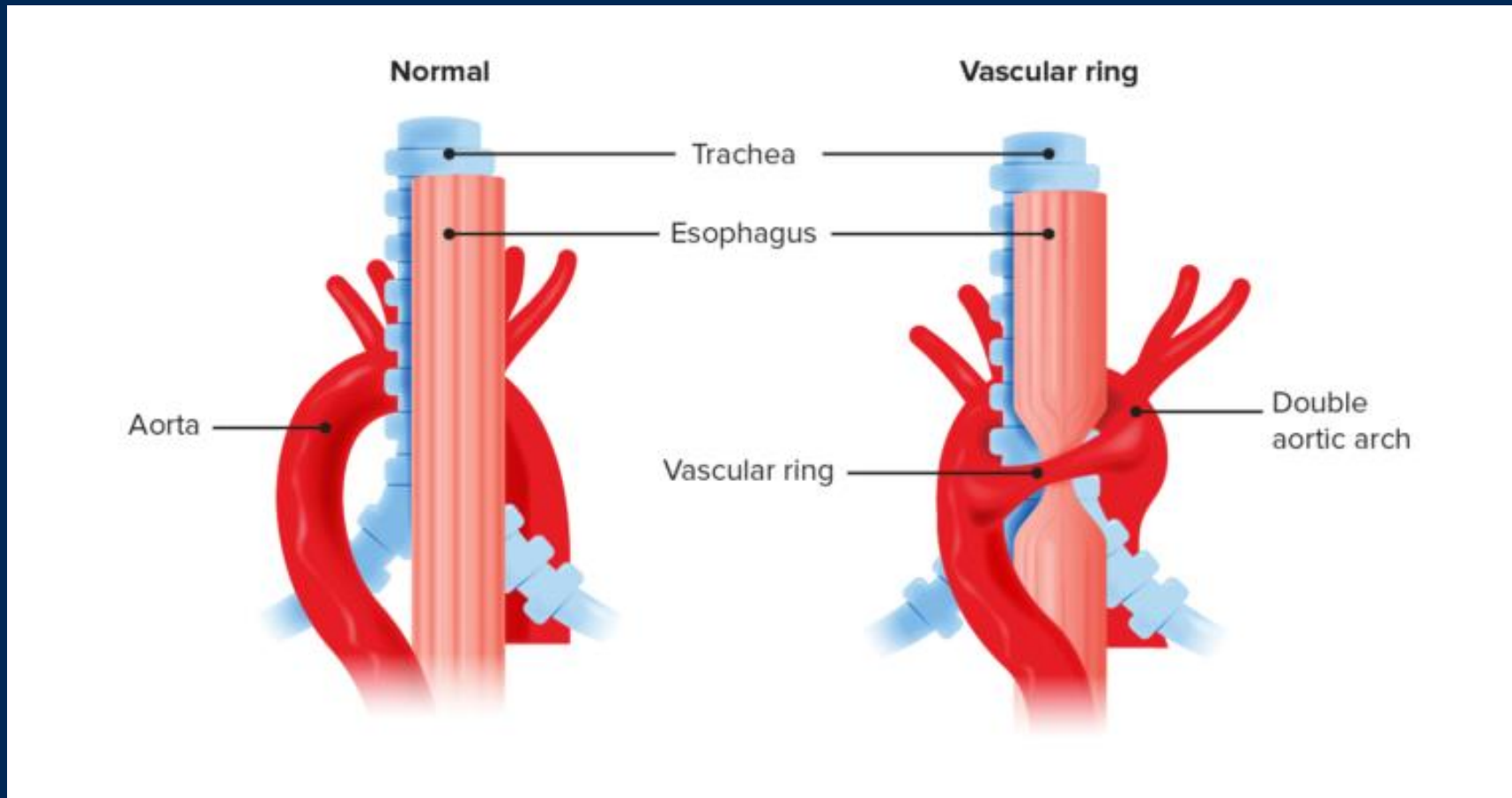


Figure 9-8. Classification of tracheoesophageal fistula. **A.** Proximal and distal esophageal atresia—frequency 7%. **B.** Proximal fistula with distal esophageal atresia—frequency 1%. **C.** Proximal esophageal atresia with distal fistula—frequency 85%. **D.** Proximal and distal fistula—3%. **E.** H-type fistula—3%. *Source:* Adapted from <https://radiologykey.com/lower-airway-obstruction/>.

Embryologic Development Where Do Things Go Wrong?

- Respiratory Tract Abnormalities (Day 22 to Week 28 of gestation)
 - Chronic lung disease (related to prematurity); lung inflammation & scarring; need ventilation
 - Laryngeal clefts (failure of the posterior cricoid lamina to fuse)
 - Complete tracheal rings (O shaped vs C shaped)
 - Tracheoesophageal fistula
 - Tracheomalacia
 - Vascular ring (ie, double aortic arch)

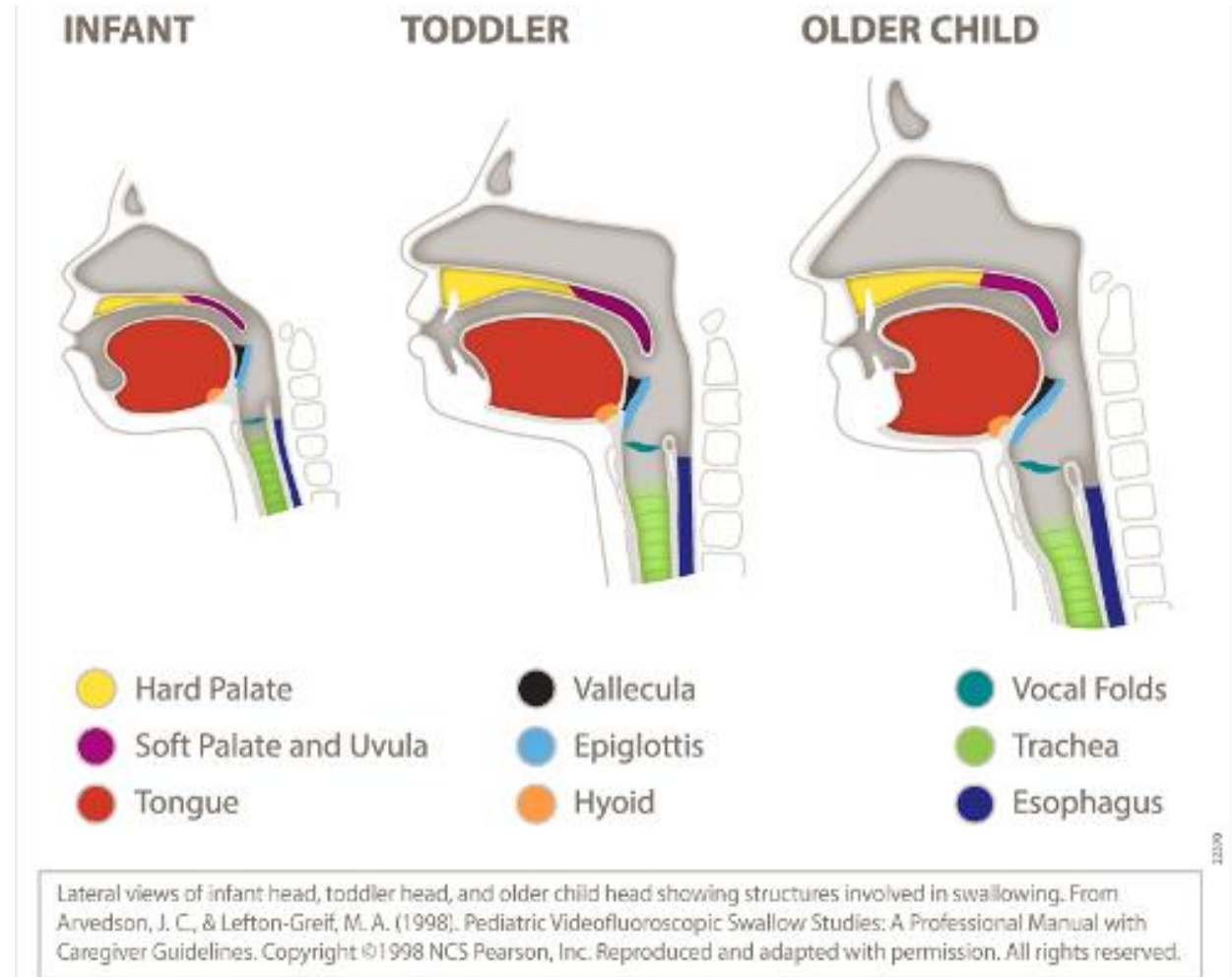
Normal Airway vs Vascular Ring



02

Pediatric Anatomy

Dysphagia: Pediatric Anatomy



Pediatric Anatomy

• INFANT

- Tongue fills more of oral cavity
- Smaller nasopharynx
- Larynx more elevated (in comparison to vertebrae)

• TODDLER

- Nasopharynx growing
- Airway getting larger

• OLDER CHILD/ADULT

- Intraoral space increasing as mandible grows down and forward
- Oral cavity elongates vertically
- Larynx and hyoid bone lower (Logemann, 1998)

03

Oral Motor Development

ORAL MOTOR DEVELOPMENT

-
- typically progresses from "early oral reflexive behaviors mediated by the brainstem to volitional oral movements"

Oral Motor Development

- **Adaptive Reflexes (4)**

- **Rooting:** aids in locating food source; typically present by 32 weeks; stroking cheeks/lips results in head turn; disappears by 6 months

- **Suckling/sucking**

- **Suckling:** "a rhythmic forward-backward motion of the tongue in conjunction with a distinct opening and closing of the jaw with loose lip approximation on the nipple"

- **Sucking:** "an up-down movement of the tongue with smaller jaw excursions and firmer approximation of the lips on the nipple"; initially reflexive, but by 4-6 months, gradual transition with volitional control

Oral Motor Development

- **Adaptive Reflexes**

- **Phasic biting:** tactile input to the gums, characterized by rhythmical bite-release pattern of jaw opening and closing; disappears by 9-12 months; will turn into a **tonic bite** (inability to release) if neurological impairment present
- **Transverse tongue reflex:** lateral movement for bolus clearance

Oral Motor Development

- **Protective Reflexes (2)**

- **Gag:** moves further back on the tongue as the infant matures
- **Cough:** expel foreign material from the airway
- **These reflexes DO NOT reintegrate**

Development of Oral Motor Feeding Skills

This is an "intricate process that requires transition from reflexive to volitional movements as myelination occurs"

Difficulty with this process indicates neurologic concern

Development of Oral Motor Feeding Skills

- **Non-nutritive sucking**

- No nutritive source (ie, pacifier, fingers)
- 2 sucks per second
- Less swallowing than nutritive sucking

- **Nutritive sucking**

- Nutritive source (ie, breast, bottle)
- Suck/swallow/breathe in 1 second

Development of Oral Motor Feeding Skills

• **Mechanics of Sucking**

- Jaw and sucking pads in cheeks provide stability
- Tongue groove stabilizes the nipple and directs flow posteriorly
- Lips and tongue form anterior seal
- Tongue compresses the nipple (positive pressure)
- Jaw/tongue drop to create suction (negative pressure)

Development of Oral Motor Feeding Skills

- **Coordination of Suck/Swallow/Breathe Triad: 1 second or less**
 - Unable to complete prior to 34 weeks' gestation d/t neurologic immaturity
 - Respiration suspended during swallowing; swallowing apnea
 - Suck bursts: longer periods of sucking followed by shorter breaks; this pattern reverses as the feeding continues
 - Breastfeeding vs bottle feeding
 - Distinctly different oral motor patterns
 - Increased non-nutritive sucking at beginning of breastfeeding until milk letdown; then increased sucking rate with letdown
 - Once letdown occurs, sucking rate is similar to bottle feeding

Development of Oral Motor Feeding Skills

- **Reflexive to Transitional Sucking (3-5 months)**
 - From reflexive movement to volitional behavior
 - Sucking pads/buccal fat pads begin to disappear
 - Cheek muscles develop

Development of Oral Motor Feeding Skills

• Development of Spoon-Feeding Skills (4-7 months)

- Transitional feeding period
- Able to be in supported sitting around 6 months
- Baby anticipates spoon presentation, opens mouth, leans in
- Anterior spillage and lingual protrusion are common
- Anterior to posterior (A-P) tongue movement developing
- Begin to use upper lip to clear spoon around 6-9 months
- Mature spoon-feeding by 24 months

Infant Spoon Feeding



Development of Oral Motor Feeding Skills

- **Development of Chewing Skills (7 months to 2 years)**
 - Phasic bite
 - Diagonal jaw movements and lateral tongue movements (6-9 months)
 - Vertical jaw movements; move bolus from mid-tongue to jaw (9-12 months)
 - Gagging common
 - Lips active in chewing to reduce spillage; diagonal rotary jaw movements (12-15 months)
 - Circular rotary movement occurs (15-24 months)
 - Chewing skills fully established at 24+ months

Early Munching/Chewing



Development of Oral Motor Feeding Skills

- **Development of Biting Skills**

- Hold easily dissolvable solids in mouth and produce intermittent phasic bites at 6-9 months

- Able to take bite around 12 months

- Able to take bite through age-appropriate foods at 18-21 months

- Mature skills at 36 months

Development of Oral Motor Feeding Skills

6. ORAL MOTOR DEVELOPMENT

Table 6-5. Development of Cup-Drinking Skills

Age Range	Oral Motor Action
4 to 6 months	Introduction of cup
6 to 8 months	Suckling pattern for liquid intake from cup; wide jaw excursions; liquid loss
8 to 12 months	Sucking pattern for liquid intake; up and down jaw excursions; tongue may protrude underneath cup to provide stability for sucking; liquid loss during intake
12 to 18 months	Sucking pattern for liquid intake; may bite down on cup to gain jaw stabilization; upper lip closes on edge of cup for seal while drinking; less jaw excursion while drinking
18 to 24 months	Use of a more mature up and down sucking pattern; cup is held between the lips; internal jaw stabilization is emerging
24 months	Use of a sucking pattern for liquid intake; may hold edge of cup with teeth; eventual development of internal jaw stabilization without biting on edge of cup

- **Cup Drinking Skills**
- Most introduce cup at 8-12 months of age
- Lingual protrusion
- Lots of anterior spillage
- Inability to close lips around cup
- May bite down on cup

Oral Motor Feeding Skills: Texture Progression

- *Liquids
- *Pureed solids
- *Fork mashed solids
- *Dissolvable hard solids
- *Soft solids, larger pieces
- *Table foods requiring more mastication
- *All solids

Table 6-6. Texture Transition During Oral Motor Feeding Skill Development

Age Range	Food Type	Examples	Oral Motor Skill
Birth to 4 months	Liquid	Breastmilk, formula	Suckling and sucking predominate
4 to 6 months	Smooth foods, purees, and blenderized foods	Rice cereal, fruit or vegetable purees, soft cookies, toddler biscuits or puffs	Anterior-posterior tongue movements
	Easily dissolvable solids may be introduced with close monitoring by feeder		Phasic biting, practice with biting, precursors to developing biting and chewing skills
7 to 9 months	Increased texture of solids, fork-mashed soft solids	Regular applesauce, mashed potatoes	Efficient sucking, emergent skills for cup drinking
	Easily dissolvable solids	Toddler cookies, soft biscuits	Emergence of tongue lateralization Vertical chewing motion in response to solids
9 to 12 months	Fork-mashed or slightly blended table foods	Casseroles, scrambled eggs, toast strips, pasta pieces, crunchy but dissolvable cookies, crackers	Increasing lateral tongue movements for mastication of foods
	Transition toward easy to manage solid foods		Vertical chewing pattern with emergence of lateral tongue movements Transition to cup drinking Trend toward less formula intake as solid intake increases
12 to 18 months	Easy to manage solid foods	Crackers, breads, casseroles, soft fruit pieces, and tender meat such as flaked fish or chicken	Consistent tongue lateralization Emergence of mature rotary chewing pattern

Texture Progression



Learning Theory

-
1. Each experience builds neural pathways
 2. Poor practice builds incorrect pathways
 3. Primitive reflexes in infants support eating while the infant gets repeated practice and exposure to learn to eat volitionally
 4. Poor outcomes may reflect poor experiences

What Happens When Oral Motor Feeding Skills Don't Develop As Planned? (Neurologic vs Structural vs Environmental Differences)

- Abnormal muscle tone: negatively affects head, neck, and trunk control
- Hypotonia: decreased tone leading to decreased strength and coordination of musculature
- Hypertonia: increased tone leading to decreased control and coordination of musculature
- Non-inhibition of primitive reflexes
- Structural differences from birth (or post-op)
- Sensory processing disorders (ie, negative input, lack of experience, neurodiversity)

04

Feeding & Swallowing Assessment



"The clinical evaluation for infants from birth to 1 year of age—including those in the NICU—includes an evaluation of pre-feeding skills, an assessment of readiness for oral feeding, an evaluation of breastfeeding...and bottle-feeding ability, and observations of caregivers with the child." (asha.org)



SLP's Must Be Competent in the Areas of:

(asha.org)

Embryology

Typical infant development

Respiratory support

Prenatal & perinatal development

Neuroprotection

Common medical comorbidities

Medical conditions in pre-term & fragile infants

Neonatal care

Role of providers & specialists

What Does A Clinical Evaluation Include?

1. Case history
2. Physical exam (developmental, respiratory, sucking/swallowing)
3. Oral feeding readiness
4. Non-nutritive sucking
5. Nutritive sucking
6. Identify additional disorders that may affect feeding/swallowing
7. Optimal feeding method
8. Duration of feeding, effect on oxygenation
9. Issues related to fatigue and volume limitations
10. Effectiveness of parent/caregiver interactions and infant interactions for feeding
11. Infant's ability to achieve appropriate nutrition/hydration via oral feeding

(asha.org)

**The importance
of a thorough
case history
cannot be
overstated.**



Oral Feeding Readiness

1. **Physiological Stability** – RR, HR, O2, digestion
2. **Motoric Stability** – muscle tone, flexion
3. **Behavioral State** – alertness level, ability to maintain alertness
4. **Non-nutritive sucking**
5. **Dipped tastes** – tolerate milk drops via pacifier or gloved finger

Nutritive Sucking Assessment

1. Suck/swallow/breathe coordination

2. Endurance – how long the infant feeds and how their coordination changes throughout the feeding

3. Efficiency – amount of volume transferred in a specific time period

4. Feeding relationship – between the infant and the caregiver and the caregiver's ability to adjust feeding methods


Pediatric Swallowing Assessment

- **Phases of Swallow**

Oral Phase – Lips to base of tongue (in infants can extend to valleculae)



Pharyngeal Phase – Base of tongue to upper esophageal sphincter (UES)



Esophageal phase – UES to lower esophageal sphincter (LES)

Pediatric Dysphagia Assessment & Treatment

- **Bedside Swallow Assessment**

- **Infants 0-6 months**

- Oral motor assessment – lingual/labial strength, ROM, coordination; buccal strength; hard palate; soft palate; non-nutritive suck on pacifier
- Look at respiratory rate – less than 60 breaths per minute
- Suck/swallow/breathe (SSB) triad requires 1 second total
- If RR>60, trial dipped tastes on pacifier

Pediatric Dysphagia Assessment & Treatment

- **Infants 0-6 months (continued)**
- If RR<60, trial breastfeeding or bottle feeding
- For NICU, use Infant Driven Feeding Scales™
- 0-3 months (or small infants), trial sidelying position; allows increased control of bolus; allows bolus to pool in cheek
- 3-12 months – upright or semi-reclined
- Observe for oral phase difficulties – anterior spillage, poor latch, poor expression of liquid, etc
- Observe for pharyngeal phase difficulties – gulping, stridor, SSB incoordination, coughing/choking, wet respirations

05

Outcome Measures

Infant Driven Feeding Scales™



SCALES

IDFS™ - Readiness

Score	Description
1	Alert or fussy prior to care. Rooting and/or hands to mouth behavior. Good tone
2	Alert once handled. Some rooting or takes pacifier. Adequate tone
3	Briefly alert with care. No hunger behaviors. No change in tone
4	Sleeping throughout care. No hunger cues. No change in tone
5	Significant change in HR, RR, O2, or work of breathing outside safe parameters

IDFS™ - Quality

Score	Description
1	Nipples with a strong coordinated SSB throughout feed
2	Nipples with a strong coordinated SSB but fatigues with progression
3	Difficulty coordinating SSB despite consistent suck
4	Nipples with a weak/inconsistent SSB; Little to no rhythm
5	Unable to coordinate SSB pattern; Significant change in HR, RR, O2, work of breathing outside safe parameters or clinically unsafe swallow during feeding

Pediatric Clinical Oral Motor/Feeding Assessment Protocols (Compiled from Willging et al)

Assessment Name	Description	Author(s)
American Speech-Language-Hearing Association Sample Templates for Evaluation	➤ "Variety of consensus-based templates for infant, toddler, and adolescent feeding assessment."	➤ Asha.org
Early Feeding Skills (EFS)	➤ "36 item checklist for assessing infant oral feeding readiness, oral feeding skill, and oral feeding recovery"	➤ Thoyre S., Shaker C., Pridham K., 2005
Functional Oral Intake Scale (FOIS)	➤ "Rates degree of oral intake on a 7-point ordinal scale, beginning with tube dependency and ending with total oral intake with no restriction."	➤ Crary M., Carnaby-Mann G., Groher M., 2005

Pediatric Clinical Oral Motor/Feeding Assessment Protocols (Compiled from Willging et al)

Assessment Name	Description	Author(s)
Neonatal Eating Outcome (NEO) Assessment	A standardized feeding tool that assesses pre-feeding behaviors, oral feeding, and observations at end of feeding. Scores based on post-menstrual age up to 46 weeks PMA	Bobbi Pineda, 2014
Neonatal Oral-Motor Assessment Scale (NOMAS)	"Observation of normal, dysfunctional, and disorganized tongue and jaw movements in infants up to 8 weeks of age.."	Braun, M., Palmer, M., 1986 (*Requires specific training for administration*)
Pediatric Eating Assessment Tool (Pedi-EAT)	"Parent report measures of problematic feeding behaviors; content validated."	Thoyre S., Pados B., Park J., et al 2014

06

Treatment Strategies

Pediatric Dysphagia Assessment & Treatment

Infants 0-6 months (Continued)

Oral Phase Strategies

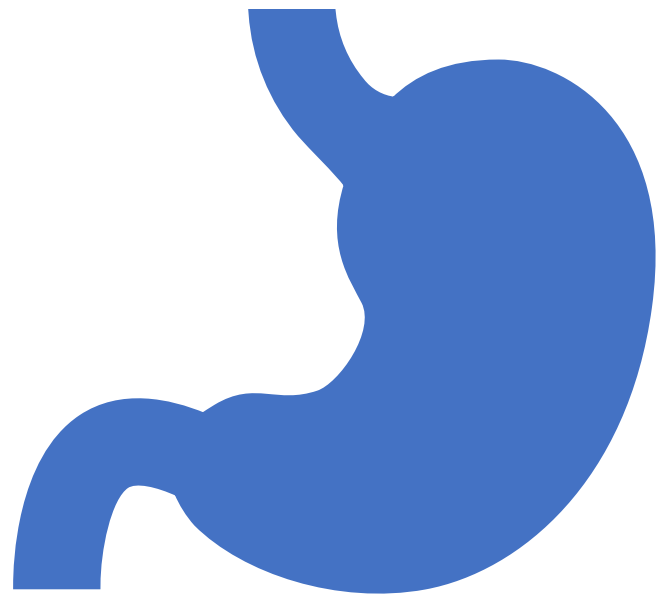
- Chin support
- Cheek support
- Change in nipple size/flow rate
- Positioning changes (breast and bottle feeding)

Pharyngeal Phase Strategies

- Pacing
- Change in nipple size/flow rate
- Positioning changes
- Thickening liquids/Viscosity changes
- Volume limits

External Feeding Strategies





Pediatric Dysphagia Assessment & Treatment

- **Gastroesophageal Reflux (GER)**
- **Infants** – frequent spitting up; arching back/fussiness with feeds; may have weight loss
- May benefit from thickened feeds (ie, Enfamil AR), smaller more frequent feedings, burping frequently, upright 30 minutes+ following feeds
- Severe cases may require tube feeding that bypasses the stomach (ie, NJ or GJ tube feeds)

Pediatric Dysphagia Assessment & Treatment

6-12 months

- Similar assessment to 0-6 months; oral motor assessment; breast/bottle assessment
- May begin to assess cup drinking (8 mos +)
- Assess pureed solids (spoon feeding) 6 months+
- Assess hard dissolvable solids (ie, Gerber puffs, Cheerios) and early table foods (8 mos+)

Toddlers thru Adolescents

- Oral motor assessment
- Assess age-appropriate cup drinking (ie, sippy cup, open cup, straw, etc)
- Assess various solid consistencies (ie, pureed solid, soft solid, regular/hard solid)
- Behavioral feeding therapy for oral aversion (positive reinforcement, reward system)

Feeding Recommendations

No PO vs PO (or both)

Liquid consistency

Solid consistency (if age-appropriate)

Is there a volume limit?

Positioning requirements

Compensatory feeding strategies

Reflux precautions

Is further instrumental assessment needed?

07

Instrumental Assessment



Videofluoroscopic Swallow Study (VFSS)

Videofluoroscopic Swallow Study (VFSS)

- "The principal imaging tool for the evaluation of swallowing physiology and the effect of targeted interventions on swallowing function."
- Dynamic (vs static) assessment; pt has to participate
- Upright or elevated sidelying position
- Patient drinks liquid barium via bottle, cup, straw, etc
- If age appropriate, patient eats pureed solid, soft solid, hard solid
- Oral phase – sucks per swallow, oral holding, bolus size
- Pharyngeal phase – swallow delay, nasopharyngeal reflux, laryngeal penetration, aspiration, pharyngeal residue, pharyngeal constriction

VFSS (continued)

- Esophageal phase - "backflow" of contents; compare to level of the UES ("below," "at," or "above" the level of the UES); does patient aspirate backflow of contents?
- Barium consistencies – thin, slightly thick/half-nectar thick, mildly thick/nectar thick, moderately thick/honey thick
- Barium paste for solids
- Adjust modalities, consistencies, positioning, compensatory feeding strategies to achieve safest swallow
- Make/update feeding recommendations (NPO vs PO) as well as compensatory feeding strategies, positioning, etc
- Do NOT recommend a consistency and/or modality that you have not assessed!
- Describe the dysphagia (if present) and why/how the breakdown occurs
- VFSS is NOT a pass/fail test

Penetration-Aspiration Scale

- Rating Scale 1-8
- Measures the contrast location in relation to the vocal folds
- Records if there is any attempt by the patient to eject the contrast
- Is there a response to aspiration?

Penetration-Aspiration Scale	
PA Scale Score	Description
1	No contrast enters the airway.
2	Contrast enters the airway, remains above the vocal folds, and is ejected from the airway (not seen in the airway at the end of the swallow).
3	Contrast enters the airway, remains above the vocal folds, and is not ejected from the airway (is seen in airway after the swallow).
4	Contrast enters the airway, contacts the vocal folds , and is ejected from the airway.
5	Contrast enters the airway, contacts the vocal folds , and is not ejected from the airway.
6	Contrast enters the airway, crosses the plane of the vocal folds , and is ejected from the airway.
7	Contrast enters the airway, crosses the plane of the vocal folds , and is not ejected from the airway despite effort.
8	Contrast enters the airway, crosses the plane of the vocal folds , is not ejected from the airway and there is no response to aspiration.

Normal Infant VFSS





Infant VFSS with Aspiration



VFSS: Timing is Everything

When is a VFSS Indicated?

- Patient is taking a minimum of 10-15 mL at bedside with SLP
- Patient showing s/s of aspiration with one consistency, but not others
- Patient has a diagnosis that is at high risk for aspiration (ie, vocal cord paralysis, brain stem stroke)
- Patient is clinically not improving (ie, unable to wean from O2, not gaining weight, vomiting with feeds)
- Following intervention that would positively/negatively influence swallow function (ie, cardiac repair, ENT intervention)
- Post-trach
- Repeat VFSS to attempt to upgrade consistencies (with hx of silent aspiration)

When is a VFSS NOT Indicated?

- No clinical s/s of aspiration; patient advancing toward feeding goals
- Patient clinically has s/s of aspiration across consistencies
- Patient is refusing solids/liquids
- Patient accepting limited and/or inconsistent PO intake
- Patient is unable to transport to radiology
- Patient is unable to tolerate positioning for >15-30 minutes
- Patient requiring increased respiratory support compared to baseline
- Patient has acute illness (that will resolve with time) that negatively affects swallow function
- Respiratory rate > 60 breaths/minute; has tachypnea
- End of life/quality of life

Radiation exposure from videofluoroscopic swallow studies in children with type 1 laryngeal cleft and pharyngeal dysphagia: A retrospective review (Hersh et al, 2016)

- Children have a projected lifetime risk of cancer
- Exposure to radiation should be reduced if within our capacity
- "The objective of this study is to quantify the amount of ionizing radiation in care for children being treated for aspiration....to create best practice pathways to maintain quality of care while minimizing radiation exposure."
- Retrospective review of 78 children seen in an aerodigestive center over 5 years (2008 – 2013)
- Mean age 19.9 months (4 months – 12 years)
- Number of VFSS per child and mean effective dose of radiation quantified
- Children received a mean of 3.24 studies (range 1-10)
- Average effective radiation dose was 0.16 mSv per study; CXR at facility yields a radiation dose of 0.017 mSv
- Over the course of management, "a patient receives an equivalent total of 30.6 CXR"
- Conclusion: "...future developments are indicated to create innovative clinical pathways and limit radiation exposure."

BaByVFSSImP For Videofluoroscopic Assessment of Swallowing Impairment in Bottle-Fed Babies

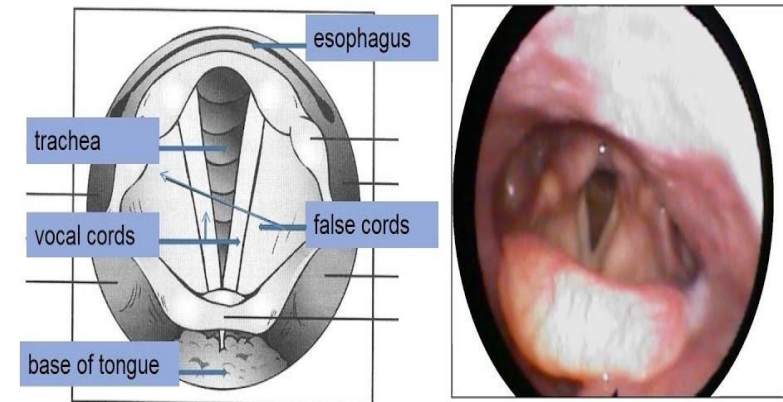
**Maureen Lefton-Greif &
Bonnie Martin-Harris**

northernspeech.com



Fiberoptic Endoscopic Evaluation of Swallowing (FEES)

A quick orientation to the FEES view...



FEES: Aspiration of thin liquids



08

To thicken...
...or not to thicken...

Liquid Consistencies

Thin

Slightly Thick/Half-Nectar

Mildly Thick/Nectar

Moderately Thick/Honey

International Dysphagia Diet Standardization Initiative (IDDSI)



Copyright: The International Dysphagia Diet Standardisation Initiative 2016
@ <https://iddsi.org/framework/>

Thickening Agents

0-12 months

- Oatmeal Cereal (Earth's Best)
- Rice Cereal (limited use due to arsenic)
- Enfamil AR – slightly thick
- Enfamil AR 24 cal – mildly thick
- GelMix - use to mix with breastmilk; can only mix to mildly thick; need doctor orders for moderately thick; 42 weeks GA; not FDA approved
- ***premature infants may not be candidates (and/or small % of feeds)

12 months +

- Simply Thick (no history of NEC)
- **3 years +**
- Powder based thickener (ie, Thicken Up)

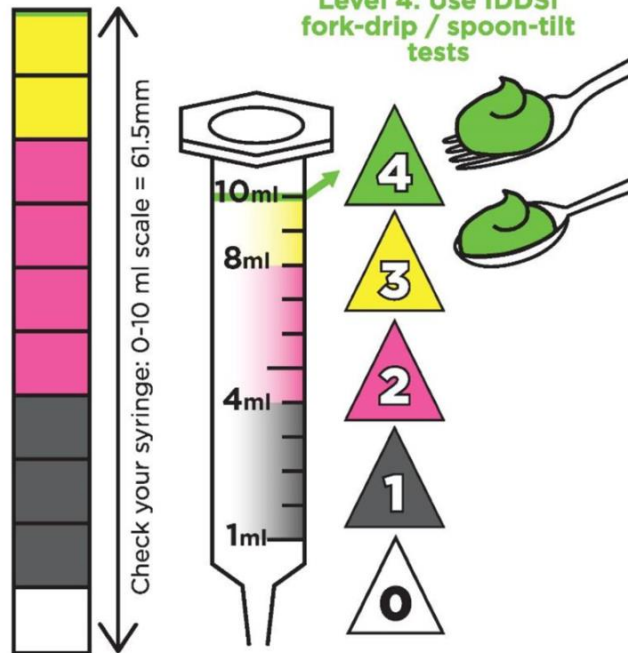
IDDSI Flow Test



Flow Test

IDDSI level depends on liquid remaining after 10 seconds flow.

Level 4: Use IDDSI fork-drip / spoon-tilt tests



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Nipple Flow Rates – Dr. Brown's

- Ultra preemie nipple
- Preemie nipple
- Transition nipple
- Level 1 nipple (thin or slightly thick if using Enfamil AR or Gelmix)
- Level 2 nipple (slightly thick)
- Level 3 nipple (mildly thick)
- Level 4 nipple (mildly thick if thickened with cereal)
- Y-cut nipple (moderately thick)
- X-cut nipple (Evenflo; moderately thick)

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Enteral Feeds

What If A Child Is Not Safe or Not Ready for Oral Feeding?

TUBE FEEDING OPTIONS

Oral gastric tube (mainly preemies or cleft lip/palate)

Nasogastric tube (NG)

Nasojejunostomy tube (NJ)

Gastrostomy tube (GT)

Gastrojejunostomy tube (GJ)

Tube Feedings: What's the Difference?

OG, NG, GT

- Goes through the mouth, nose, or abdomen to get to the stomach
- Can be fed continuously, compressed (over a certain time period), or by gravity
- OG/NG placed at bedside; GT requires surgery

NJ, GJ

- Goes through the nose or abdomen and through the stomach to get to the small intestine
- **MUST** be continuous/drip rate to prevent perforation of intestine
- NJ must be placed under fluoroscopy; GJ placed surgically

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Common Populations

Common Pediatric Dysphagia Populations

Cleft Lip & Palate

Congenital Cardiac

Respiratory Difficulties
requiring Trach and/or Vent



Cleft Lip & Palate

Cleft Lip/Palate

- Complete oral motor assessment
- What type of cleft lip and/or palate?
- Assess breathing; does patient have a stable airway?
- If safe to feed orally, determine which bottle will work best for baby
- Babies are unable to successfully breastfeed with a cleft palate d/t no negative pressure created. Babies may nuzzle at mom's breast for bonding.
- Assess for successful transfer of milk with bottle system
- Burp frequently d/t extra air swallowed

Cleft Lip/Palate: Comparing Bottles

Dr. Brown's Specialty Feeding System

- Looks like a standard Dr. Brown's bottle with the exception of a blue disc to allow for flow
- Can use any of the Dr. Brown's nipples
- Patient driven; milk expressed when infant bites/attempts to suck on nipple
- CANNOT be used with thickened liquids (except Enfamil AR)

Medela Special Needs Feeder

- Looks different from a standard bottle
- Long teat; some infants may gag
- One nipple with 3 flow rates; point lines at baby's nose
- Caregiver driven; caregiver provides assistive squeezes to express milk
- CANNOT be used with thickened liquids

Cleft Lip/Palate: Comparing Bottles

Dr. Brown's Specialty Feeding System

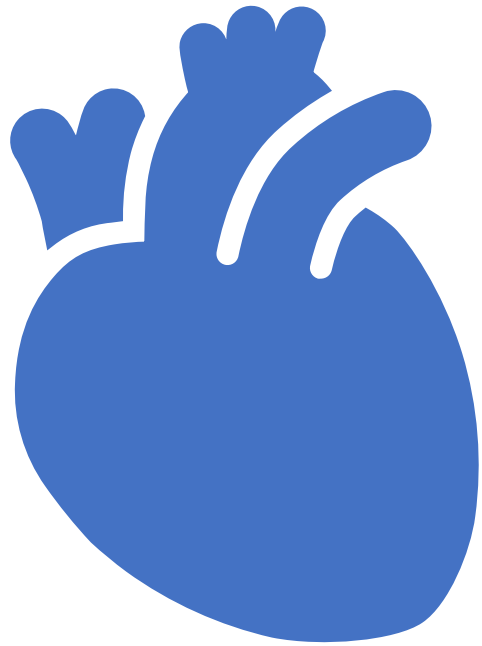


Medela Special Needs Feeder





Pre- and Post-Cardiac Repair



Pre- and/or Post-Cardiac Repair

- **Common Cardiac Diagnoses**
- ASD/VSD
- Coarctation of the Aorta
- Hypoplastic Left Heart Syndrome (HLHS)
- Patent Ductus Arteriosus
- Tetralogy of Fallot

How Can Cardiac Issues Affect Swallowing?

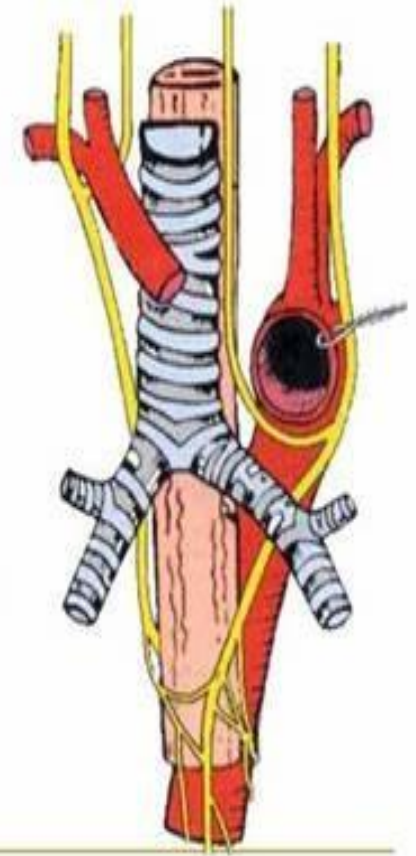
- Any diagnosis affecting the ventricles typically causes increased RR; the ventricles do most of the pumping; therefore, the body has to work harder to breathe. Faster breathing = poor suck/swallow/ breathe coordination.
- Any surgery around the aorta can damage the recurrent laryngeal nerve which innervates the vocal cords. The vocal cords are our last line of defense to protect our airway. If these are damaged, we have an increased risk of aspiration.
- Cardiac surgery requires intubation. Extended intubation can cause swelling in the airway post-extubation.
- Cardiac surgery often requires sedation meds. Patients may be on a weaning schedule and may demonstrate withdrawal symptoms (ie, gagging, vomiting).

Recurrent Laryngeal Nerves

Recurrent laryngeal nerves

- Right one hooks around right subclavian artery, left one hooks aortic arch
- Both ascend in tracheo-esophageal groove
- Nerves enter larynx posterior to cricothyroid joint, the nerve is now called inferior laryngeal nerve
- Innervations: laryngeal mucosa below fissure of glottis , all laryngeal laryngeal muscles except cricothyroid

Bronchial and esophageal branches



Cardiac Population: Providing "pockets" of intervention

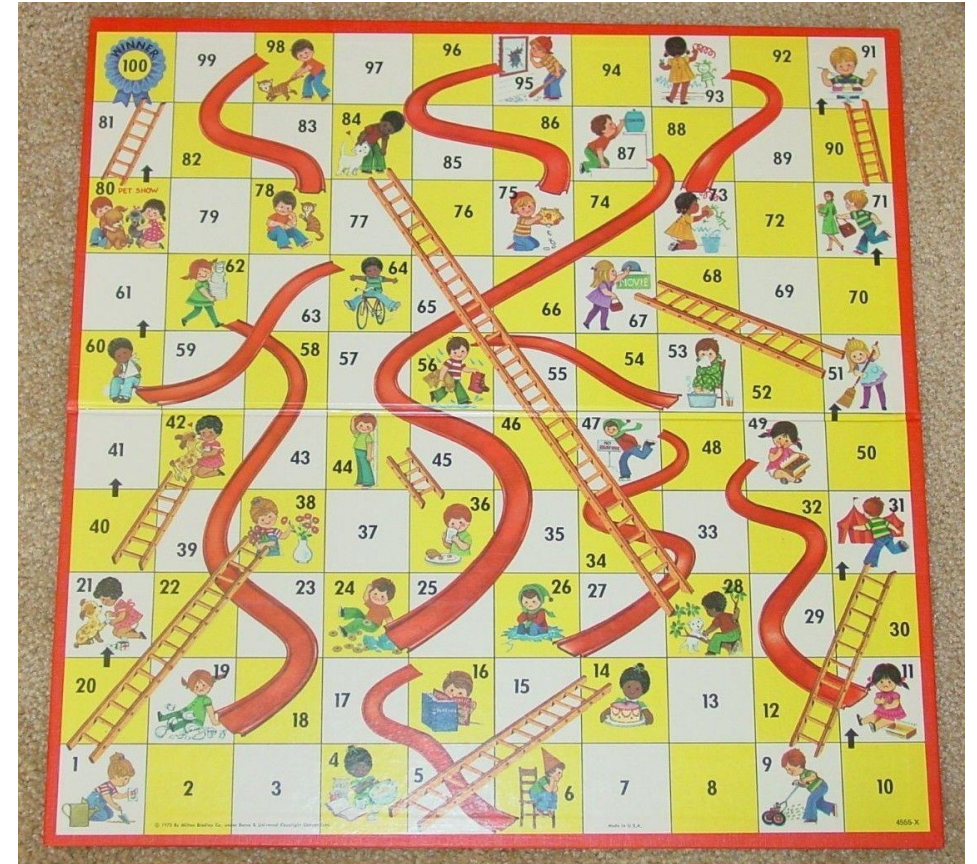
Infant Feeding Milestones

- Hours following birth: skin to skin; first oral feeding
- 0-1 month: establishing breastfeeding; bonding; suck/swallow/breathe coordination
- 1-3 months: establishing positive feeding experiences and oral feeding routines
- 3-6 months: integration of reflexes; behavioral feeding; pureed solid introduction

Surgical Intervention

- Surgical placement of intracardiac lines; restricted holding
- Stage 1/Norwood repair; palliative surgeries, cardiac cath lab, sedation meds
- Septal defect repairs, cardiac cath labs, sedation meds
- Stage 2/Glenn procedure; septal defect repairs; cardiac cath lab, sedation meds

Assessing and treating feeding and swallowing difficulties in the infant cardiac population often looks and feels a lot like...



Trachs & Vents

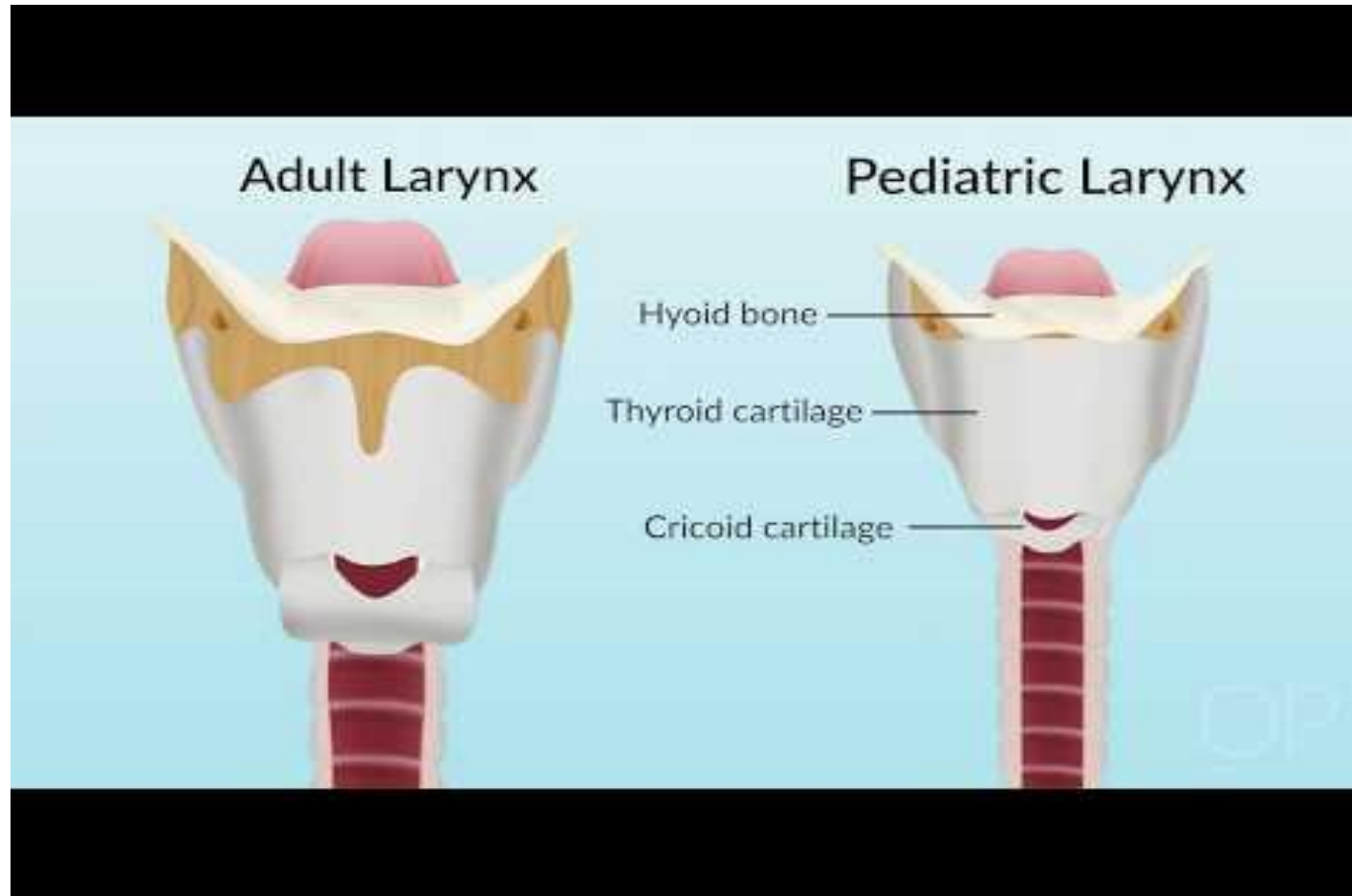
Trach



Trach & Vent



Tracheostomy Primer



Passy Muir Valves to the Rescue!

One-way valve

Aqua – fits in-line on a ventilator

Purple & Clear – fit directly on a trach

O2 adaptor



What's So Great About Passy Muir Valves?

Restores subglottic pressure

"Speaking Valve" - allows voice and speech production

Improves swallow function; may reduce aspiration

Improves sense of taste and smell

Improves secretion management & cough production

Assists with bowel movements

May assist with ventilator weaning and decannulation

Passy Muir Valve: How Does It Work?

Positive end-expiratory pressure (PEEP) is the pressure in the lungs above atmospheric pressure that remains in the lungs

PMV's restore physiologic PEEP

We want to begin PMV trials as soon as possible!



Trach/Vent: Assessment

Tracheostomy

- Bedside swallow assessment
- Possible blue dye test
- VFSS always warranted
- Trial Passy Muir Valve (PMV) prior to VFSS
- Complete VFSS with PMV if able to tolerate

Trach & Vent

- May trial PMV if PEEP = 10 or less in pediatrics
- Need to cut PEEP in half or eliminate it on ventilator (PMV re-establishes physiological PEEP)
- May trial PO if no mechanical rate or CPAP settings; proceed cautiously if on mech rate
- VFSS always warranted prior to PO recommendations



PMV's & Respiratory Therapists (RT)

- Tracheostomy only – RT typically present first or second sessions; then SLP completes trials independently; then cleared for nursing and family
- Ventilator dependent – RT is always present to monitor and change vent settings

SLP as an Advocate



Care Conference



Interpreters (phone vs in-person)



Social work, psych consult



Type of assessment needed (ie, clinical assessment vs instrumental assessment)



Rounds – helping to tell the pt's story, supporting family



Be a good listener



"Do you have any more questions?"



"Is there anything else I can do for you?"

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How Do I Further
Develop My Skills?

- Purchase/read Willging et al (2019) book, *Pediatric Dysphagia: Etiologies, Diagnosis, and Management*
- Passy Muir Valve website for trach/vent courses
- Attend pediatric dysphagia/feeding courses (ask others what courses helped them)
- Observe at a pediatric hospital (inpatient, outpatient, etc)
- Apply for job within a system in which you want to work—even if it not the specific job you want
- Join social media groups related to feeding and swallowing; listen to podcasts, etc



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Quiz

1. What are 3 important parts of a feeding/swallowing evaluation?
2. What are different positions that could be used in infant feeding?
3. What are some ways to facilitate improved suck/swallow/breathe coordination?
4. What are some strategies you could try if you notice signs/symptoms of aspiration with infant feeding?
5. When would you recommend a VFSS?
6. What are some important things to remember when completing a VFSS?
7. What's an instrumental assessment that can be used with breastfeeding?
8. If an infant has a trach and/or vent, what is something that could facilitate improved swallow function? Is a VFSS always needed with these patients?
9. What are 3 common populations of infants with feeding/swallowing challenges?
10. What's one thing you can do to grow your pediatric feeding/swallowing competency?



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Questions?



Thank you

Jennifer C. Hall, MA CCC-SLP

jennifer.hall@helendevoschildrens.org