Pediatric Dysphagia Praxis Review Course

Sponsored by the National Black Association of Speech Language & Hearing

Lindsay Meyer Turner, PhD, CCC-SLP, CNT, CBS

Financial Disclosure

- I am receiving a speaking fee from the National Black Association of Speech Language & Hearing for this presentation.
- I have no relevant non-financial relationships to disclose.

About the speaker...

- Graduate of Millsaps College, Southern University and A&M College, and Louisiana State University
- 10 years pediatric experience
- 8 years NICU experience
- HCA Houston Healthcare Kingwood Level III NICU
- Certified Neonatal Therapist
- Certified Breastfeeding Specialist

Objectives

- describe the role of the SLP with pediatric feeding & swallowing patients
- explain normal development of feeding and swallowing anatomy
- identify 3 diagnoses/deficits that cause feeding/swallowing problems in the pediatric population
- identify 3 treatment approaches in the management of pediatric feeding/swallowing patients

According to ASHA...

- **Dysphagia (swallowing disorders):** can occur in one or more of the four phases of swallowing and can result in aspiration and/ or retrograde flow of food into the nasal cavity or out of the esophagus
- **Feeding disorders:** problems with a range of eating activities that may or may not include dysphagia. Characterized by:
  - failure to master self-feeding skills
  - failure to use developmentally appropriate utensils and feeding devices
  - disruptive or inappropriate mealtime behavior
  - less than optimal growth

https://www.asha.org/Practice-Portal/Clinical-Topics/Pediatric-Dysphagia

Prevalence of Feeding & Swallowing Issues

- 25-33% of children struggle with some type of feeding and/or growth issue before turning 10 years old
- 33-50% of these children will outgrow their feeding issues within 2-3 years
- 3-10% of infants and children will have some significant or persistent feeding and/or growth issue over time
- dysphagia affects ~85% of children with developmental disabilities and up to 5% of typically developing children

Reilly et al., 1996; Reu et al., 1996; Mathisen et al., 1989; Carruth et al., 2001

- Children with ongoing feeding and growth difficulties went on to have significant delays in motor, language, and behavior milestones at 18 and 30 months of age

Motion, Northstone, & Edmond (2001)

NCD Risk Factor Collaboration (2017)

- 5-19 years old
- 75 million girls and 117 million boys worldwide are considered moderately or severely underweight
- 50 million girls and 74 million boys were obese
- obesity is increasing, there are still more underweight children than overweight

Our Role in Pediatric Feeding & Swallowing

- communication evaluation and intervention
- feeding and swallowing evaluation and intervention
- parent/caregiver education and counseling
- staff/medical professional education and collaboration
- discharge/transition/home program planning
- oral motor, non-nutritive, and oral-feeding evaluations and interventions
- provide assistance and recommendations for breast-feeding mothers
- educate in the areas of pre-linguistic, cognitive-linguistic, speech, and language development

https://www.asha.org/Practice-Portal/Clinical-Topics/Pediatric-Dysphagia

Pediatric Knowledge...

- normal embryology, anatomy, swallowing physiology, and neurophysiology, as well as postural and sensory bases underlying swallowing and feeding in a developmental framework
- etiologies (e.g., genetic syndromes, brain injury, metabolic disorders, gastrointestinal tract disorders that affect premature and term infants) that cause or contribute to swallowing and feeding disorders
- nutrition and consequences of under-nutrition in the first 2 years of life and throughout childhood
- medical tests and procedures as they affect swallowing and feeding
- pulmonary implications and complications resulting from aspiration
- dehydration implications and complications resulting from dehydration
- infant and early childhood development as it relates to parent-child interactions and communication

https://www.asha.org/Practice-Portal/Clinical-Topics/Pediatric-Dysphagia

...and Skills

- recognize signs and symptoms of suck, swallow, and respiratory organization and disorganization
- discuss and educate parents and other professionals about etiologies and nutrition
- make appropriate referrals
- demonstrate awareness of risks for aspiration consequences through management decisions that do not place infants and young children with complex dysphagia issues at increased health risks
- identify and interpret cognitive and communication levels of function as a basis for management decisions in a holistic approach to the child's environment
- perform and interpret instrumental assessment appropriate for the specific age and developmental level of the infant/child
- carry out treatment for swallowing and feeding disorders appropriate for the specific age of the infant/child

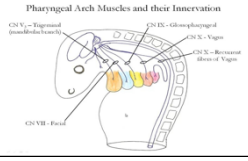
https://www.asha.org/Practice-Portal/Clinical-Topics/Pediatric-Dysphagia

Feeding Development

Pharyngeal Arches

- 1st through 4th pair are visible; 5th and 6th are not visible

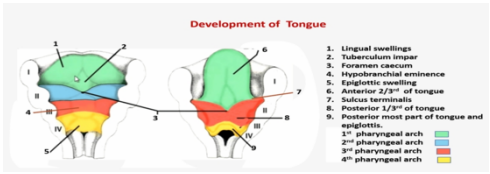
- **1st arch:** maxillary and mandibular prominences, muscles of mastication, ear
- **2nd arch:** ear, facial expression muscles
- **3rd arch:** hyoid bone
- **4th arch:** fuses with 6th arch to form laryngeal cartilages
- **5th arch:** no derivatives
- **6th arch:** intrinsic muscles of larynx



Tongue Development

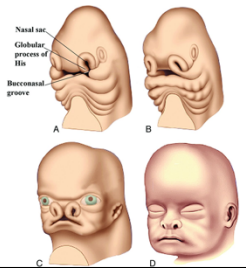
- first indication at 4 weeks with "tongue buds"
- salivary glands weeks 6-7
- lingual papillae appear at end of 8 weeks
- filiform papillae at 10-11 weeks
- taste buds at 11-13 weeks

*fetal response to bitter taste at 26-28 weeks



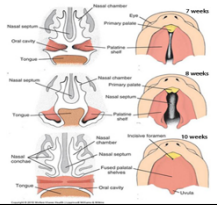
Facial Development

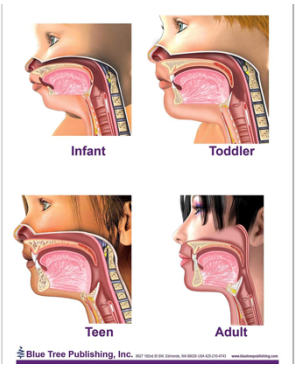
- primarily during weeks 4-8
- face looks "normal" at end of embryonic period
- lower jaw and lower lip form first



Palatogenesis (Palate Development)

- begins in week 6 and ends at week 12
- critical period of development occurs at end of week 6 though beginning of week 9
  - Primary palate: develops early in week 6, forms anterior and midline aspects of maxilla
  - Secondary palate: early in week 6; most of hard and soft palates





Oral Motor Reflex Development

- **suckling/sucking:** present at 27 weeks, transition around 3-6 months
- **swallowing:** present at 12 weeks
- **rooting:** present at 32 weeks, integrates around 3-6 months
- **tongue protrusion:** present at 27 weeks, integrates around 3-6 months
- **tongue lateralization:** present at 28 weeks, integrates around 6-9 months
- **phasic bite:** present at 28 weeks, integrates around 9-12 months
- **gag:** present at 27-28 weeks, diminishes around 6-9 months, never integrates

Oral Feeding Development

Age (months)	Development/posture	Feeding/oral sensorimotor
Birth to 4–6	Neck and trunk with balanced flexor and extensor tone Visual fixation and tracking Learning to control body against gravity Sitting with support near 6 months Rolling over Brings hands to mouth	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)	Sitting independently for short time Self-oral stimulation (mouthing hands and toys) Extended reach with pincer grasp Visual interest in small objects Object permanence Stranger anxiety Crawling on belly, creeping on all fours	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	Pulling to stand Cruising along furniture First steps by 12 months Assisting with spoon; some become independent Refining pincer grasp	Cup drinking Eats lumpy, mashed food Finger feeding for easily dissolvable solids Chewing includes rotary jaw action

Arvedson (2006)

Oral Feeding Development

12–18	Refining all gross and fine motor skills Walking independently Climbing stairs Running Grasping and releasing with precision	Self-feeding: grasps spoon with whole hand Holding cup with 2 hands Drinking with 4–5 consecutive swallows Holding and tipping bottle
>18–24	Improving equilibrium with refinement of upper extremity coordination. Increasing attention and persistence in play activities Parallel or imitative play Independence from parents Using tools	Swallowing with lip closure Self-feeding predominates Chewing broad range of food Up–down tongue movements precise
24–36	Refining skills Jumping in place Pedaling tricycle Using scissors	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)

Dysphagia by Phase

Consequences of Pediatric Feeding and Swallowing Disorders

1. airway invasion/aspiration
2. respiratory illness (e.g., pneumonia)
3. child is unable or unwilling to eat a variety of age-appropriate foods
4. low volume of intake and poor weight gain
5. limited food repertoire
6. limited variety of textures
7. prolonged mealtime duration (>30 minutes)
8. problematic behavior at mealtimes
9. family stress
10. decreased quality of life

Oral Prep/Transit Phases

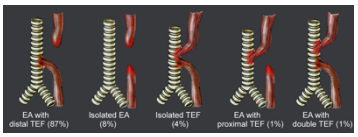
- cleft lip and/or palate
- absent oral motor reflexes
- weak, uncoordinated sucking
- immature biting and chewing
- oral apraxia
- tongue and/or lip ties (TOTs)
- micro- or macroglossia
- micro-/retrognathia
- cranial nerve damage
- brain injury

Pharyngeal Phase

- poor SSB coordination
- delayed triggering of swallow
- poor pharyngeal clearance
- BPD/CLD
- enlarged tonsils
- laryngeal cleft
- cranial nerve damage
- RLN damage
- brain injury

Esophageal Phase

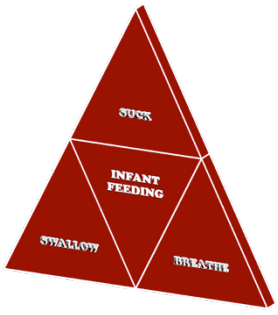
- impaired UES or LES opening
- GER/GERD
- decreased motility
- delayed gastric emptying
- esophageal atresia
- tracheoesophageal fistula
- esophagitis
- strictures
- achalasia
- brain injury



Common Diagnoses/Issues Associated with Pediatric Dysphagia

1. pulmonary hypoplasia
2. respiratory distress syndrome
3. bronchopulmonary dysplasia
4. laryngomalacia
5. heart defects
6. prematurity
7. necrotizing enterocolitis
8. hirschsprung's disease
9. gastroesophageal reflux
10. microcephaly
11. intraventricular hemorrhage
12. hypoxic ischemic encephalopathy
13. stroke
14. dandy walker malformation
15. treacher collins syndrome
16. digeorge syndrome
17. moebius syndrome
18. jaundice
19. diabetes
20. neonatal abstinence syndrome
21. tethered oral tissues
22. autism spectrum disorders
23. gastroschisis
24. seizures
25. cerebral palsy
26. medication
27. prolonged tube feedings
28. pierre robin sequence

Neonatal/Infant Feeding & Swallowing



Wolf & Glass (1992)

SSB Coordination Development

- Around 28 weeks GA; more mature at 32-34 weeks GA
- Fully sequenced SSB 1:1:1 pattern including great respiratory support at full term
- If not developed:
  - Choking
  - Protective cough at 36 weeks
    - Most pre-term infants do not have cough
    - What happens when cough is not developed?
      - **Chemoreceptors** in the laryngeal vestibule trigger a physiological response to airway invasion which can cause A/B/D's

Vergara (2004)

Suckling/Sucking Function

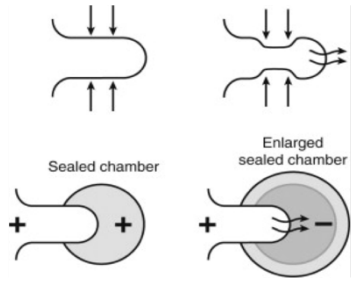
Suction:

- Generation of an intraoral **negative** pressure to draw liquid into the mouth
- Closure of the nasal passages by the soft palate, tight labial seal around breast or bottle, lowering of the mandible

Expression:

- **Positive** pressure exerted by the tongue against the hard palate by squeezing or stripping to eject milk

Compression vs. Suction



Wolf & Glass (1992)

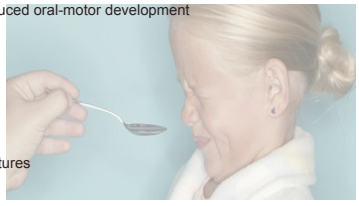
Early Feeding Affects Later Feeding

- Thoyre, 2007
  - 54% of parents at 1 month PMA reported a feeding problem
  - Feeding difficulties are a major concern for families post-discharge
  - High percentage of children with FTT and feeding disorders were preterm
- Samara et al., 2010
  - Oral hypersensitivity and behavioral feeding problems found in 25% of extremely premature children at 6 years of age
  - Oral motor dysfunction persisted in 33% of extremely premature children

Young Children: Picky Feeders, Problem Feeders, & ARFID

Sensory Issues in Pediatrics

- Unpleasant oral experiences, delayed introduction to oral feeds, chronic illness, neurological issues, feeding tubes, intubation, application/removal of facial tape
- Oral Aversion
  - reluctance, avoidance, or fear of eating, drinking or accepting sensation on or around the mouth
  - mild to severe
  - apprehension, defensiveness
  - may lead to FTT and reduced oral-motor development
- Indicators
  - poor suck
  - food refusal
  - gagging
  - drooling
  - vomiting
  - slow feeding
  - pocketing
  - refusal to progress in textures



Behavioral Issues

- Poor habits, lack of structure/routine, eating with distractions, inconsistent expectations, lack of limit setting
- Problem behaviors at mealtime
  - refusal to sit at the table
  - refusal to feed self when capable
  - throwing food
  - vomiting to conclude the meal or get attention
  - eats better for some people or in certain places
  - no medical reason!

Selective/Picky Eaters

- unwillingness to try new foods and refusal to eat unfamiliar foods
- refuses food from an entire food group
- refuses to eat a color of food or texture
- limited number of accepted foods and lack of diet variety (<30 foods)
- gets upset when pressured by parents to eat
- more likely to be served a "special meal"

- Parental report of their children being "somewhat" to "very picky":
  - 4-6 months = 19%
  - 7-8 months = 25%
  - 9-11 months = 29%
  - 12-14 months = 35%
  - 15-18 months = 46%
  - 19-24 months = 50%

Carruth & Skinner (2000); Carruth et. al. (2004)

Problem Feeders

- very picky eaters
- persistent picky eating
- severe feeding problems
- severe selective eaters
- poor eaters
- delayed eaters

- limited appetite
- minimal amount of accepted foods (<10-15 foods)
- poor weight gain/malnutrition
- delayed oral motor development
- sensory sensitivity
- unsupportive parenting styles
- duration of feeding difficulties >2 years
- disruption of mealtimes

Kezner et.al (2017)

Avoidant/Restrictive Food Intake Disorder (ARFID)

- manifested by persistent failure to meet appropriate nutritional and/or caloric needs associated with at least one of the following
  - significant weight loss
  - significant nutritional deficiency
  - dependence on enteral (tube) feeding or oral supplements
  - marked interference with psychosocial functioning

- typically have had more infant feeding issues (Micali et al., 2016)

DSM V: 307.59

ARFID Sub-Types

1. Lack of interest in eating or food (poor appetite, low to no response to food, failure to recognize hunger)
2. Avoidance based on sensory characteristics (selective eating, sensory food aversion, extreme picky eating)
3. Concern about aversive consequences of eating (afraid to vomit, gag, or choke; stops eating secondary to medical procedure or event)

Evaluation & Treatment

Area	Example
Body Structures	Anatomy, physiology, and neurology of oral, pharyngeal, laryngeal, and esophageal structures
Body Functions	Physiologic stability, cognitive skills, motor skills, sensory development Suckling/sucking, swallowing, biting, chewing
Activity vs. Disability	Skills involved in self-feeding, drinking from from bottle/cup/straw
Participation vs. Handicap	Engagement during mealtimes at home, school, restaurant
Personal and Environmental Factors	Family's a) understanding of feeding limitations, b) access to appropriate foods/utensils/support, c) willingness to participate Societal/cultural judgment of families

Chart Review/Case History

-Gestational Age (GA)

-Maternal hx/pregnancy complications?

-Birth history (APGARs, BW, csx/svd)

-Diagnoses, surgeries, testing/ imaging

-Course of treatment in NICU
- -Respiratory support
- -Feeding tubes
- -Medications

-Feeding at home (diet, utensils, support)

-Family/social issues

-Other milestones
- -Motor
- -Speech/language
- -Social
- -Behavior
- -Sensory

-Allergies, intolerances

-Medications

Example Questions to Ask Parents

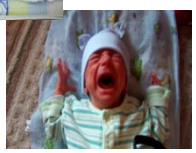
1. How long does it take to feed your child?
2. Is your child totally dependent on others for feeding?
3. Does your child refuse foods?
4. Are mealtimes stressful?
5. Have you noticed a change in weight?
6. Are there any signs of respiratory distress such as congestion?
7. Does your child vomit regularly?
8. Does your child get irritable or lethargic during mealtimes?

Neonatal/Infant Clinical Examination

1. State/alertness, hunger cues, self-regulation
2. Physiological status (HR/O2/RR)
3. Stress cues, engagement cues
4. Reflexes
   a. gag/phasic bite/rooting/sucking/swallow/tongue lateralization/ tongue thrust
5. Physical strength/stability/posture
6. Oral-facial structures (oral mechanism examination)
   a. jaw/cheeks/lips/tongue/palate/pharynx/larynx
7. NNS
   a. burst cycles/endurance/labial seal/cupping/strength/rhythmicity
8. NS
   a. burst cycles/endurance/amount/fluid loss/cupping/strength/ response/stress cues

Infant States of Alertness/ Consciousness

1. Sedated
2. Quiet Sleep
3. Active Sleep
4. Drowsy
5. Quiet Alert
6. Active Alert
7. Mild irritability, crying
8. Extreme irritability



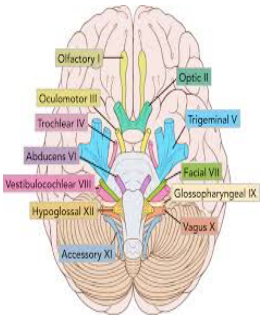
Stress Cues

Neonatal and premature infant stress cues can involve the autonomic, motor, and/or state/attention systems:

- apnea, bradycardia, desaturations
- increased WOB (nasal flaring, head bobbing)
- decreased/increased tone
- rapid state changes
- falling asleep
- yawning
- sneezing
- hiccuping
- arching
- turning head from stimulus
- stop signs
- gagging
- vomiting
- crying
- color changes
- facial grimacing
- tremor

Cranial Nerve Exam

- **Rooting**
  - CN V, VII, XI, XII
- **Phasic Bite**
  - CN V
- **Tongue Protrusion**
  - CN XII
- **Transverse Tongue**
  - CN V, VII, IX, XII
- **Swallowing**
  - CN V, VII, IX, X, XII
- **Sucking**
  - CN V, VII, IX, X
- **Gag**
  - CN IX, X



Oral Mechanism Examination

- Cheeks
  - Tone, symmetry, frenulum
- Lips
  - Tone, symmetry, cleft, movement, frenulum*
- Jaw
  - Symmetry, excursion, position at rest
- Tongue
  - Tone, frenulum*, movement, symmetry, cupping, groove
- Palate
  - Shape, height, cleft

Feeding Involves Multiple Layers

- organ systems
- muscles
- senses
- learning: style, capacity, history
- development
- nutritional status
- environment

Important Considerations for Feeding/Mealtime Observation

1. Feeding schedule: What time does the infant/child typically eat meals?
2. Mealtime location: Where is the infant/child typically consuming meals?
3. Duration of meals: How long does it take for infant/child to finish meals?
4. Hunger/satiation cycle: Is there anything that may affect infant/child's ability to feel hunger or full?
5. Developmental level: Is the infant/child delayed in development?
6. Tools for consumption: Bottlefed? Breastfed? Spoon feeding? WOW cup?
7. Food preferences: Does infant/child demonstrate a preference for specific formula, food, liquids, etc?
8. Interest and motivation: Is child willing to complete the tasks?

STRENGTHS?
WEAKNESSES?
WHAT WORKED?
WHAT DID NOT WORK?
ADDITIONAL EVALUATION? MBSS/FEES? REFERRALS?
PROGNOSIS?
GOALS?
RECOMMENDATIONS? EDUCATION? HEP?

Common Neonatal/ Pediatric Interventions

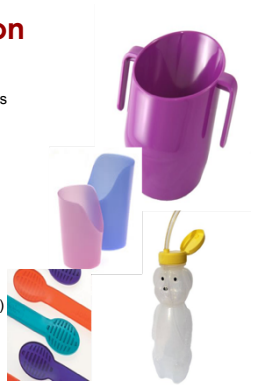
- adjust flow rate
  - change nipples
  - cups
  - straws
- change position
  - upright
  - sidelying
  - breastfeeding holds?
- utilize pacing especially with bottles
- alter viscosity, texture, temperature, or flavor
- adjust time or feeding schedule
- supplementation via NG, OG, G-tube, or J-tube

Structure and Function Strategies

- Oral stimulation
  - tapping
  - vibration
  - stretches
- Oral motor exercises
  - passive vs. active
- Positioning
  - during and after feeding
  - special chairs (e.g., Bumbo, foot support, "corner" chairs)
- Oral motor techniques
  - tongue groove cues
  - chin support
  - cheek support
  - pacing

Structure and Function Strategies

- Specialized bottles, nipples, utensils, and cups
  - cleft palate bottle
  - cross-cut/y-cut nipples
  - Honey Bear cups
  - textured spoons
- Other interventions
  - thickening liquids
  - change formula
  - allergy testing
  - medication (i.e., GI issues)
  - surgery (e.g., cleft repair, supraglottoplasty)
  - NPO



Food Chaining

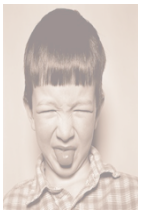
- Taking accepted foods/liquids in child's repertoire and modifying or linking them to other foods
- May take several days or weeks to complete a "chain"
- Goal is to increase variety of foods in child's repertoire

Texture Fading

- Based in psychological theories (e.g., change deafness, change blindness) that small changes go unnoticed
- Taking accepted texture and changing it slightly until the child accepts a new texture

Treating Sensory Issues

- Oral exploration and oral experiences
  - encouraging hand to mouth
  - mouthing toys
  - pleasurable stroking to lips, cheeks
  - giving kisses
  - rubbing face with variety of textured cloths/blankets
- Oral stimulation prior to feeding for HYPOsensitivity
- Oral motor exercises
- Sensory Integration

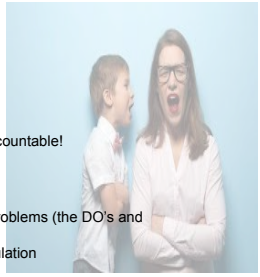


Treating Behavioral Feeding Issues

- Promote structure and routine
- Turn off the television
- Model appropriate behaviors at the table
- Provide SPECIFIC positive reinforcement frequently
- Feeding time limited to 30 minutes
- NO FORCE FEEDING!!
- Refer to behavioral specialist of psychologist?
- Discourage “grazing” and snacking between meals
- Limit milk and juices
- Ignore undesirable behaviors

Parent and Caregiver Education

- Stages of Grief
  - denial
  - anger
  - depression
  - disorganization
  - eventual adaptation/coping
- Home programs...MUST hold parents accountable!
- Teach
  - positive vs. negative reinforcement
  - age-appropriate praise/awards
  - ways to prevent or minimize feeding problems (the DO’s and DON’Ts)
  - modeling, shaping, antecedent manipulation
- Food journal or diary
- Model and observe in therapy sessions



#GOALS

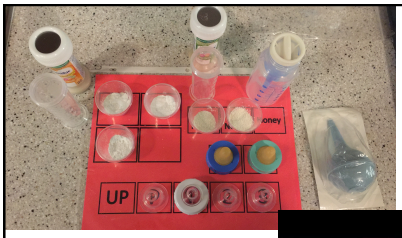
Our goal is for the infant/child to learn to safely and efficiently eat any and all foods in order to develop a healthy lifelong relationship with food.

Toomey (2020)

IMAGING STUDIES

Modified Barium Swallowing Study (MBSS)

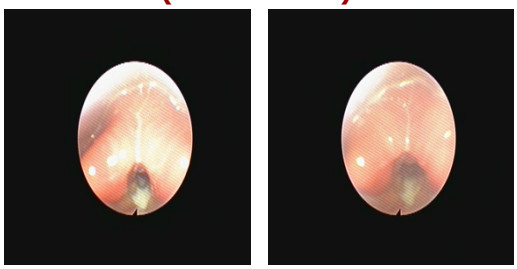
- "Gold Standard"
- SLP and radiologist
- lateral and A-P views of oral, pharyngeal, and esophageal stages
- variety of textures and viscosities
- barium and radiation



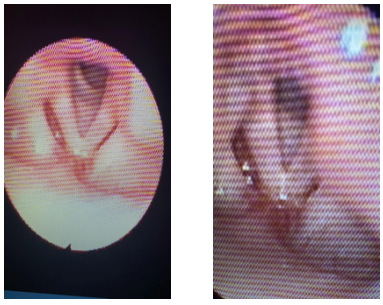
Fiberoptic Endoscopic Evaluation of Swallowing (FEES)

- SLP passes scope transnasally
- view of the hypopharynx
- no radiation or barium
- can be done at bedside
- for infants, can be done during breast feeding
- has "white out" during the swallow

Silent Aspiration in former 23 weeker (38 wks PMA)



Swollen and Irritated Ventricles between TVF and FVF



THANK YOU FOR YOUR TIME AND GOOD LUCK!!