Normal Swallowing and Dysphagia: Pediatric Population

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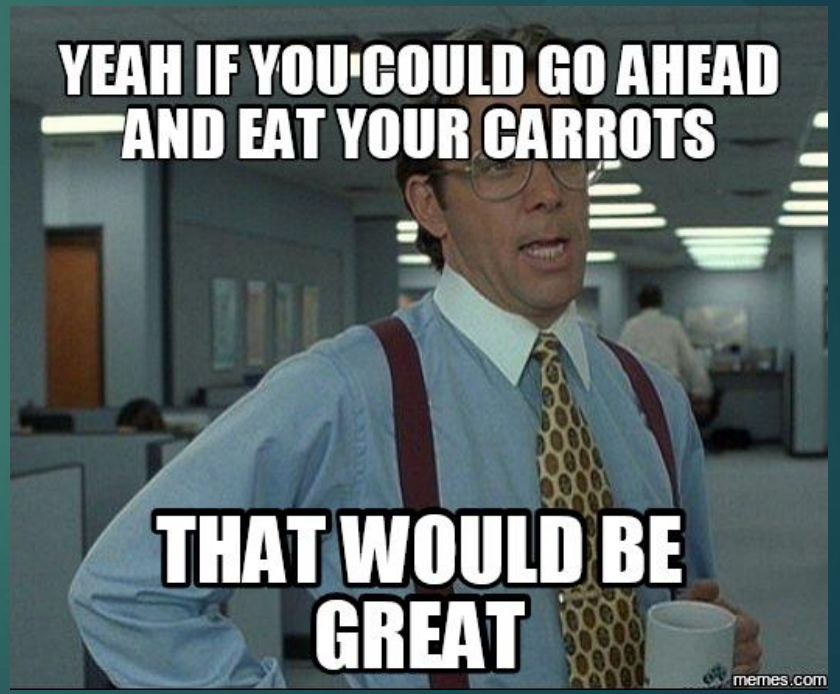


Who is this guy?

Graduated from Wayne State University – 2009 (Master's)

Clinical Fellowship – Detroit Institute for Children

Working at Beaumont since 2011

-Children with speech and language disorders

-Children with swallowing disorders

-AAC

Working for Encore Rehabilitation since 2009

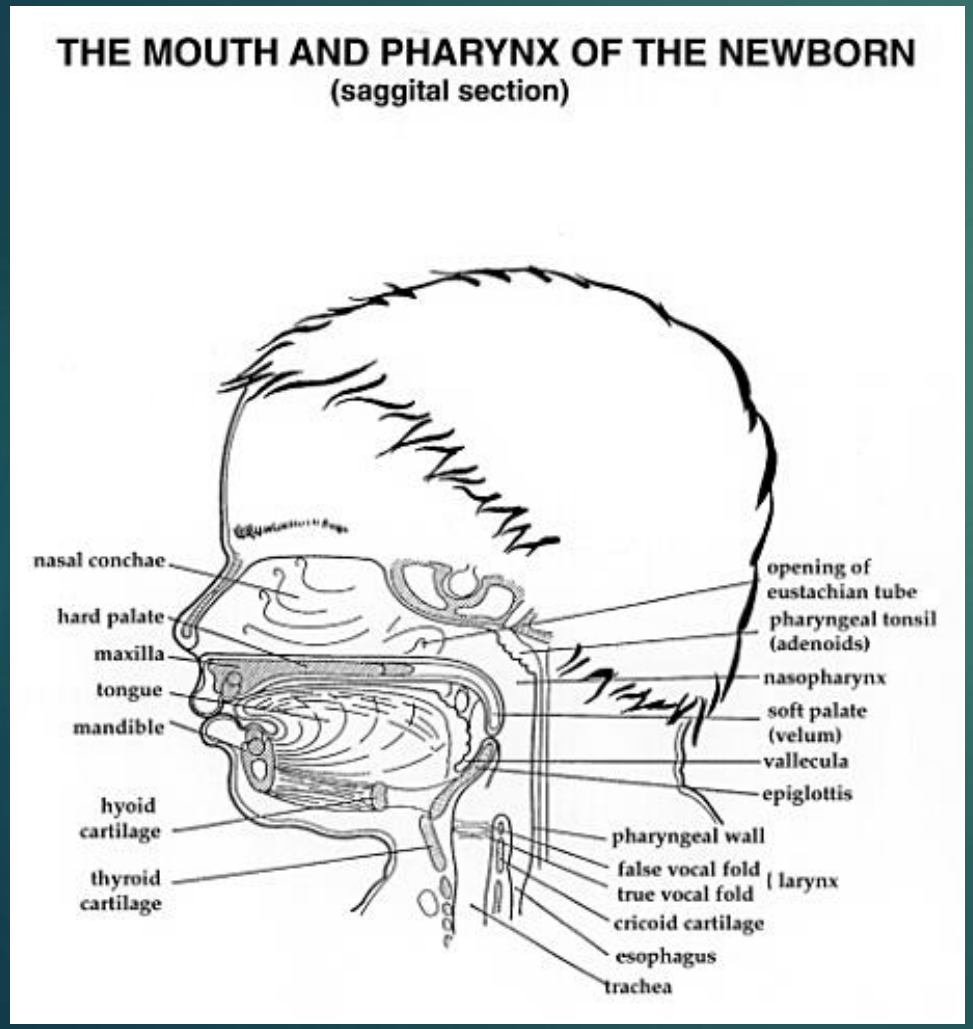
-Adults in skilled nursing facilities

Certified as an Assistive Technology Specialist – California State University (Dominguez Hills)

Dave, what are we talking about today?

- Normal swallowing mechanism for infants.
- Anatomic differences between adults and children and why they are significant.
- Disorders associated with pediatric swallowing issues.
- Dysphagia treatment for the pediatric population.

Normal Swallowing Mechanism for Infants

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Normal Infant Swallowing

- Swallowing begins in utero
- After birth infant needs to learn to coordinate suck-swallow-breathe
- Feeding involves:
  - Ability to engage in physiologically and behaviorally challenging task
  - Organizing oral movements
  - Coordinate breathing with swallowing
  - Regulating depth and frequency of breathing to maintain physiologic stability

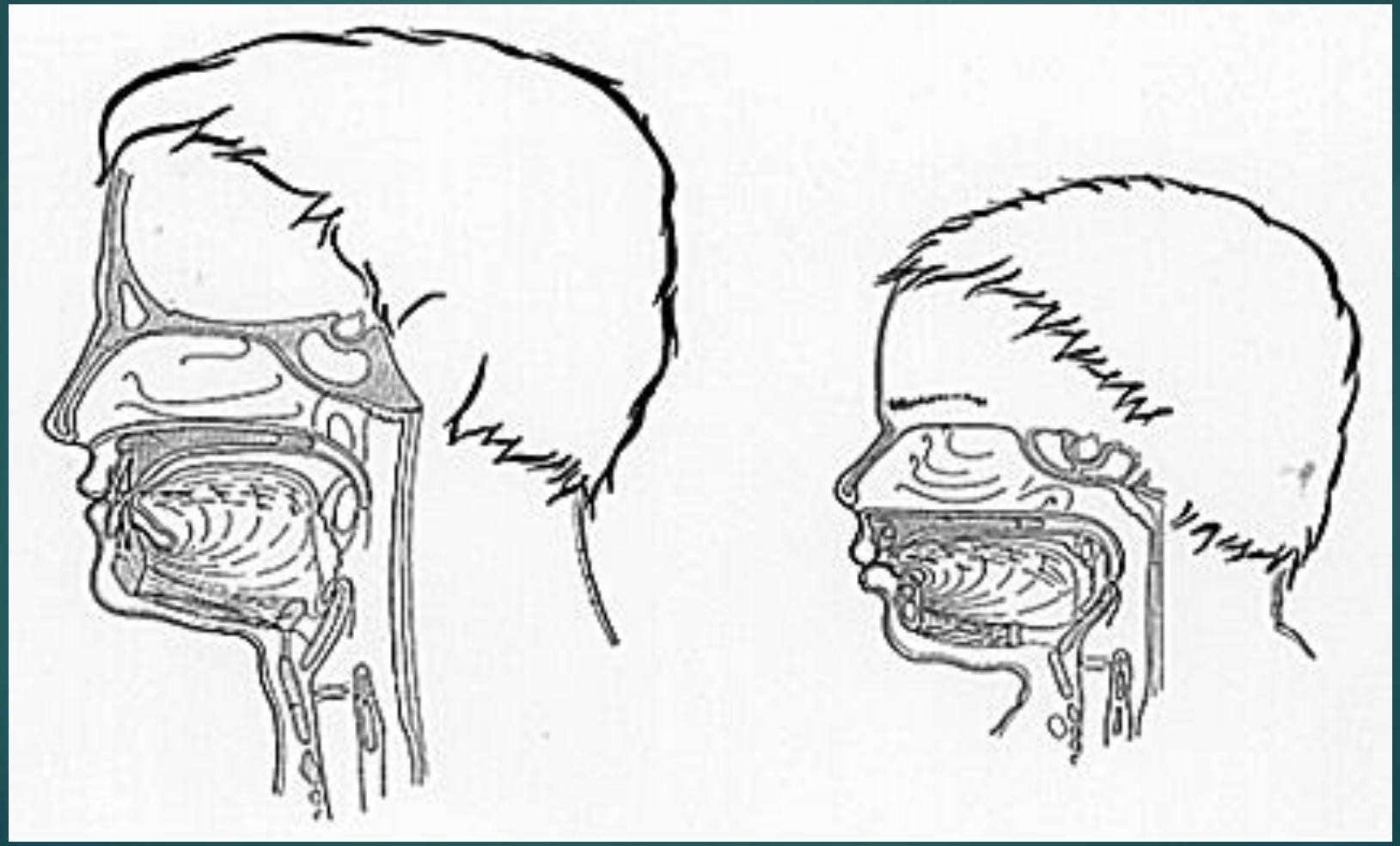
Normal Anatomy for Infants

- Infants tongue is large in oral cavity, creates central tongue groove to create negative pressure
- Pharynx of infant- hyoid high in neck, less laryngeal elevation during swallow, pharynx is gentle curve from nasopharynx to distal pharynx (adults ~90 degree angle)
- Larynx descends in first year of life to accommodate communication
- Oral motor components for successful feeding:
  - Lips, jaw, tongue, buccal mucosa, hard and soft palate

Breastfeeding Video

- https://www.youtube.com/watch?v=57XpotptRCI

Anatomic Differences Between Adults and Children



What's the same?

- Neuroanatomy- cranial nerves and innervation of swallowing
- Anatomy: the trachea is at C6 and remains there through adulthood

What's different?

- Anatomic changes
  - Newborns tongue fills oral cavity
  - Infant's oral cavity is proportionately smaller
  - Posterior tongue descends into the pharynx by 9 years of age
  - Fat pads- the proportion of adipose tissue reduces over time
  - At the end of the first year of life the halves of the mandible fuse
  - In infants the epiglottis is in direct contact with the velum
  - Pyriform sinuses are elevated and smaller in infants
  - The larynx descends from C3 to C7 in adulthood
  - The pharynx is a narrow tube but subsequently the posterior tongue forms the anterior wall of the pharynx

What's different (cont'd)

- Positioning- Infant can lie flat/supine to swallow until roughly 9 months of age, while coordinating breathing and sucking simultaneously, after 9 months of age an incline is necessary for safe swallowing
- Development of other skills are dependent upon feeding milestones- communication, sensory processing and development, socialization, motor coordination, speech
- Nutrition and fat needed for brain development
- Feeding facilitates bonding with the parents or caregivers

Maternal Conditions

- Risk factors:
  - Poor diet
  - Maternal weight
  - Maternal age
  - Smoking
  - Substance abuse
  - Pre-existing medical conditions- diabetes, cardiac disease, preeclampsia, use of steroids, anemia, infections (toxoplasmosis, herpes, cytomegalovirus, strep)

Gastroesophageal Reflux Disease

- GER flow of stomach's contents into esophagus, extremely common in infants
- GERD pathologic reflux with complications
- Without emesis GER may go undetected
- Intestinal dysmotility
- Respiratory problems- aspiration, laryngospasm, stridor, apnea
- Infant may lay prone or left-side down, PPIs, thickened feeds, UGI, 24 hour pH probe

Tracheoesophageal Fistula and Atresia

- Occur early in first trimester when esophagus and trachea form abnormally with small hole
- Clinical signs choking, coughing, cyanosis with feeding, high risk aspiration, respiratory distress, abdominal distention
- Infant not fed orally until after surgical intervention, and difficulty feeding postoperatively

Respiratory Disorders

- Infants supported by vent for lengthy periods can develop oral aversions and palatal grooving from endotracheal tube
- Respiratory Distress Syndrome (RDS)
- Transient Tachypnea (TTN)
- Apnea (>20 seconds)
- Bronchopulmonary Dysplasia (BPD)

- Hydrocephalus
  - Excess cerebrospinal fluids in ventricles, decrease reabsorption or overproduction
  - Large head, widened sutures, full fontanelle, setting sun eyes, vomiting, lethargy, irritability
  - Ventriculoperitoneal shunt (VP shunt) for cerebral decompression

- Seizures
  - Symptom of neurologic dysfunction, not a disease
  - Causes: metabolic, infection, IVH, drug withdrawal, idiopathic
  - Eye blinking, fluttering, deviation of eyes, nonnutritive sucking, lip smacking, drooling

Congenital Anomalies

- Chromosomal, environmental, multifactorial, idiopathic causes
- Multiple characteristics define/accompany syndromes- including facial features, musculoskeletal, cardiac, renal, GI, genital abnormalies
- Often cognitive and motor impairments that affect feeding, structural disorders of head and neck

- Cleft Lip
- Cleft Palate

Unilateral/bilateral

Lip, Palate or both lip and palate

Sensory Impact on Feeding

- Sensory Processing- ability to receive information through sense, organize, and make meaningful responses
- SPD- hyper or hypo responses to sensory informaiton- defensiveness, modulation, registration
  - Sensory Defensiveness- hypersensitivity (gagging, restricted feeding, texture restrictive)
  - Sensory Underregistration- hyposensitivity (stuffer, sloppy, messy, drooling, coughing/choking, licking, nonfood items, prefer savory, salty, spicy foods)

Autism Spectrum Disorders

- GERD, chronic constipation
- Sensory integrative dysfunction
- Language delays
- Tx TEACCH (Tx Edn of Autistic and related Communication-Handicapped Children), PECS

Cerebral Palsy

- Classified according to location of neuromuscular involvement (diplegia, quadriplegia, hemiplegia)
- Spasticity, athetosis, hypotonia
- CP is most common congenital neurogenic cause of dysphagia
- Poor growth, oral closure, suck, coordinated movements, increased risk aspiration
- Tonic bite reflex

Brain Injury

- Location and severity determine feeding challenges
- 30-60% of children with brain injury presnet with feeding difficulties
- Frontal lobe-disinhibition

Down Syndrome

- 80% of children with Down Syndrome display feeding difficulties
- Cardiac, respiratory, muscle tone issues affect endurance, energy for feeding
- Higher risk GER
- Low muscle tone neck and head control, posture
- Frequent tongue thrust pattern

Treating children with dysphagia

What kids do I see for feeding/swallowing therapy?

- Ages between 16 months and 14 years
- Typically developing
- Multiply impaired

The Process

- Obtain referral
- Conduct the evaluation
- Treatment

Infants

- Premature
- Sensory and Motorically Disorganized
- Multiple Medical Issues
- Neonatal Intensive Care Unit

Fostering Stability and Organization

- Developmental Supportive Care
- Positioning!!!!!!
- Skin-to-Skin Contact

Developmental Supportive Care

- Infant Development
  - A process that involves an individual's ability to integrate new demands and new information, achieving stability at each new developmental level
- The goal of facilitating the development of feeding skills in the neonatal intensive care unit is assisting the infant in achieving stability at each level and should be viewed as important steps leading to oral ingestion
- We want to recognize the infant's cues that may disrupt his or her stability and to **minimize negative experiences during feeding**

Positioning!!!

- Proper positioning while the infant is in an incubator or crib is important in encouraging physiological stability and mature neural development and organization
- Swaddling
- Commercial products (i.e., Bendy Bumpers) can stabilize infants in position
  - Makes them sense boundaries

Skin-to-Skin Care

- "Kangaroo care"
- Contact between infant and parent – usually chest to chest with infant in upright and prone position
- Baby usually has arms and legs flexed close to baby's body with hands near mouth
- Quiet environment during this process – lights dim
- Encourages sleep, higher daily weight gain, and breastfeeding success while fostering neurobehavioral development
- Bonding

Readiness To Eat

- Attend to the infant's cues
  - They might relate to changes in neurodevelopmental milestones
- As infants adjust to their environment, speech and intensity of swallowing interventions change
- Pay attention to environmental stimuli
  - Which stimuli disrupts the child? Lighting, sounds, etc.
- If you think the child is ready to eat, remember, they are not messy at this stage
  - For example, if they are thrusting milk or formula from the mouth, there usually is a reason!
    - Maybe the nipple flow is too fast or the pace of delivery is too fast?

Readiness to Eat (Continued)

- During feeding attempts, monitor the infant's physiological state including color and respiratory patterns
- Look at their attention – make sure they can sustain their attention to the task (feeding) without disruptions from either a change in physiologic state or external stimuli that interferes with feeding success
- If negative cues occur – STOP THE FEEDING!
- Remember, we want a POSITIVE feeding experience!

Pacifiers

- Commonly used with preterm infants to assist in the nonnutritive sucking process
- May assist in strengthening the suck and in providing a more rhythmic suck pattern
- Come in various shapes, sizes and length
- Size should match the size of the infant's oral cavity, sensitivity, gag response, and sucking needs
- They may help calm the infant during stressful situations and provide positive oral stimulation

Bottles

- Made of hard or soft plastic
  - Soft plastics are flexible and cab be squeezed to assist in the rate of flow
  - Softer bottles are commonly used in children with cleft palate
  - Make sure bottles are clear so you can see the liquid inside of them
- Many types of bottles are in the market
  - Bionix – very slow to regular flow
  - Hard plastic neonatal intensive care unit bottle with slow-flow nipple

Nipples

- Nipples are characterized by the material composition that determines the nipple's shape, size and flow rate
- Many nipples are available for term and preterm infants
- Plastic vs. Silicone
  - Silicone – clear, firm and less likely to collapse
  - Plastic – tan colored, will collapse easily under pressure

Nipples (Continued)

- Nipple Shape
  - Straight vs. Orthodontic
    - Straight requires more tongue cupping by the infant and more pressure before it will collapse. Also provides consistent flow rate, although it may make it more difficulty for the infant to draw the tongue posteriorly to the pharynx
    - Orthodontic is useful when the infant has a flatter and larger tongue, requires less pressure to collapse, has a less predictable flow rate, and can draw the infant's tongue back to the pharynx
- Rule of thumb – if the infant is able to suck on your finger, he or she will usually tolerate the standardized-size nipple

Nipple Flow Rate

- Need to be adjusted as infant matures
- Usually depends on infant's sucking strength and viscosity of the liquid.
  - Breast milk has a higher flow rate than formula
- Flow rate adjustments are made by assessing:
  - The maturity of the suck
  - The coordination of the swallow
  - Breath
  - Burst control
  - Overall respiratory status of infant

Thickening Liquids

- Three consistencies….actually there are four…
  - Thin
  - Nectar
  - Honey
  - Pudding….yes….pudding!

Anyone Thirsty?

Feeding Positioning (Breast Feeding)

- Breastfeeding is more successful if head and body are supported
  - Cross-cradle hold
  - Cradle hold
  - Football hold
- Latching – refers to the way the infant takes the breast into the mouth
  - Successful when the mother's nipple and good majority of surrounding breast tissue is at the back of the infant's mouth

Feeding Positioning (Bottle Feeding)

- Cradle hold
- Upright facing the feeder
- Left or right side-lying position * Good for limiting distractions
- Facing away from feeder

Oral Sensory and Facial Stimulation

- Neuromuscular disorders
- Oral aversions
- Prolonged endotracheal tube placement
- Long-term placement of tubes in head or neck
- Gastroesophageal Reflux

Oral Sensory and Facial Stimulation (Continued)

- For the feeding therapist to try using a nipple for an infant, they may have to provide oral and sensory stimulation
- Helps with child becoming accustomed to opening mouth wide enough to latch onto nipple
- Help begin development of compression and suction pressures necessary to extract milk
- Stimulation by stroking outside of infant's mouth can help accept the nipple

Cue-Based Feeding Schedule

- If infant is older than 34-weeks gestational age, feeding therapist will initiate cue-based feeding – let the infant lead
- This schedule can happen before 34-weeks gestational age, if they are physiologically ready

Theories of Feeding Treatment

- Behavioral
- Sensory
- Oral-Motor

Feeding Treatments

- Sequential Oral Sensory (SOS) Approach
- Structured Behavioral Feeding Approach
- Beckman Oral Motor Approach

Sequential Oral Sensory (SOS) Approach

- Developed by psychologist Kay Toomey
- "Whole Child" Approach
- Integrates sensory, oral/motor, behavioral/learning, medical and nutrition
- Based on each child has specific levels of eating and food acceptance based on past experience
- Systematic desensitization
- Sub-steps to the presence of foods – interacting, smelling, touching, tasting, eating.

Structured Behavioral Feeding Approach

- Developed by Krisi Brackett
- Children obtain negative behaviors from having medical issues – often to protect themselves
- Treatment includes rewarding positive behaviors and decreasing the negative behaviors
- We want to increase acceptance of foods
- Aversive behaviors that should be addressed include: food stuffing or holding, spitting food out, food selectivity or refusal, tantrums or crying, refusal of the high chair, blocking, grimacing, and intentional vomiting or gagging

Structured Behavioral Feeding Approach (Continued)

- Program begins with appropriate supportive positioning
- Progressive applications of spoon placement are used with a prescriptive approach to what may be on the spoon (often using a dry spoon) and a specified number of trials
- Rewards are used consistently throughout – short turn with toy, few seconds of music, etc.
- Repeat sequence until child accepts spoon 10 times
- As child progresses, an increase in food variety and volume occurs

Beckman Oral Motor Approach

- Created by Debra Beckman
- Specific intervention that provide assisted movement to activate muscle contraction and to provide movement against resistance to build strength
- Increase functional response to pressure and movement, range, strength, and variety and control of movement for the lips, cheeks, jaw and tongue
- Can be used from birth to geriatric

Models of Therapy

- Choice of model should be made with consideration of the child and family needs.
- Family needs to attend the therapy sessions, or at least tape the sessions!
- Models include: Individual Therapy, Group Therapy and Intensive Day Treatment

Individual Therapy

- Traditional manner of most treatment
- Typically 1 hour, but can be 30 minutes.
- Typically weekly

Group Therapy

- Groups of four to six children of similar ages and needs
- Usually last 10-12 weeks
- Usually includes one or more feeding specialist (SLP, OT)
- Optimal

Intensive Day Treatment

- Designed for children with needs that require a higher degree of medical and therapeutic monitoring
- Usually held in a hospital session
- Usually designed for quick transition from tube feedings to oral feedings during the course of several weeks

Family-Friendly Goals

- Keep in mind, parents blame themselves for their child's poor eating, even if there is a presence of a known physical problem over which they have no control
- Parents can experience depression, anxiety, anger and frustration
- Provide parents and/or caregivers with appropriate feeding training, setting of realistic goals, regular instruction for home practice, and the expectations for periodic setbacks

Short-Term Goals

- Should be achievable by a 3-month period
- Oral motor movement
- Sensory acceptance of food
- The ability to allow food to remain on the high chair or plate
- Child's ability to remain in the high chair for a designated time
- Self-feeding skills
- Cup drinking skills
- Tasting new foods
- Eating a specific number of bites per meal
- Increasing the number of foods within designated food category
- Increasing the amount of food eaten between meals

Cultural Considerations

- Address during the evaluation and feeding therapy
- Mother vs. Father during feedings – location of seating
- Seasonings
- Language

Developing a Care Plan

- Review the details of the feeding evaluation
- Care plan should address:
  - Therapist and family goals
  - Review and discuss all medical precautions and recommendations including food sensitivities, positioning, dietary recommendations, and food or liquid restrictions
  - Special equipment that will be used
  - Feeding goals that are functionally based, measurable, and within the family's capability
  - Detailed review and rationale of the day's therapeutic activities

Preparing the Child for Eating

- Feeding interventions always are targeted toward developmentally appropriate activities for the child.
  - Example, gross motor play for the child who is reluctant to participate with actual food. Try toy food…
- Sensory activities are often helpful to prepared the child
  - March to the room
- Nonoral proprioceptive and tactile activities are great!
  - Painting with pudding
- Chewy tubes!
- NUK Massage Brush
- We want a POSITIVE environment!

Introducing New Foods

- Repeat experiences
- Neophobia – refusal of "new" foods
- Begin with a previously accepted food with continued modifications of taste, texture, or quantity, always working on just one change at a time.
- Small changes – moving from pureed food to a fork-mashed version, for example.
- Link food changes – color, taste, temperature, texture, form, size and shape
- Guide treatment by developmental hierarchy, rather than the age of the child when increasing levels

Introducing New Foods (Continued)

- Once a new food is readily accepted by child, it can be added at mealtimes
  - If a child is unable to advance past jarred puree, try home-made puree
- Have parent feed child in therapeutic setting!

Changing Taste and Texture

- Humans have 8 senses – touch, taste, smell, vision – hearing, preoprioceptive, vestibular, kinesthetic
  - Children can hear a “crunch,” or know if a food is “mushy.”

Meltable Solids

- Dry, formed food that when placed in the mouth will dissolve with only a minimal mashing pattern needed, versus actual chewing.
- Reduce the risk of choking
- Offer the opportunity for child to progress beyond purees and liquids

Hard Munchables

- Meant for oral exploration only
- Designed to develop pre-chewing skills
- Tongue Lateralization
- Move sensitivity of gag response further to the back of the mouth

Choosing Utensils

- Age
- Functional Needs
- Oral Structure
- Self-feeding skills

Choosing Utensils -Mouth Opening (Size and Range)

- Larger base of a bottle nipple may not be a good match for a child with a restricted mouth opening
- Bowl of the spoon should be approximately one-third to two-thirds the length of the child's lower lip; it should not reach from corner to corner of the mouth
  - Maroon Spoons!!!
- Same applies for open cup to activate lips and control the liquid

Choosing Utensils (Sucking Strength)

- Particular populations may need specialized nipples during feedings
  - Cleft palate – Pigeon Nipple, Haberman bottle system
- Training to use a straw – Honey Bear!

Swallowing Skills

- Variable flow rates – Bottle nipples and certain cups – Infatrainer!
- Reduced coordinating swallowing may require a slower flow rate
- Thicker liquids may require a faster flow rate
- Flexi-Cut Cup – Let's just make our own!
  - Reduces flexion of the head and neck!

Age

- 12 months of age is typically the transition age from bottle to cup
  - I would even start sooner! Maybe 9-10 months!
- Sippy cups are great for messes…but not for development!

Reinforcement

- You want to end the feeding session on a positive note!
- Short time in high chair, swallowing one taste of food, touch a certain food
- Reinforcement goes a long way in feeding therapy

Tube Feeding

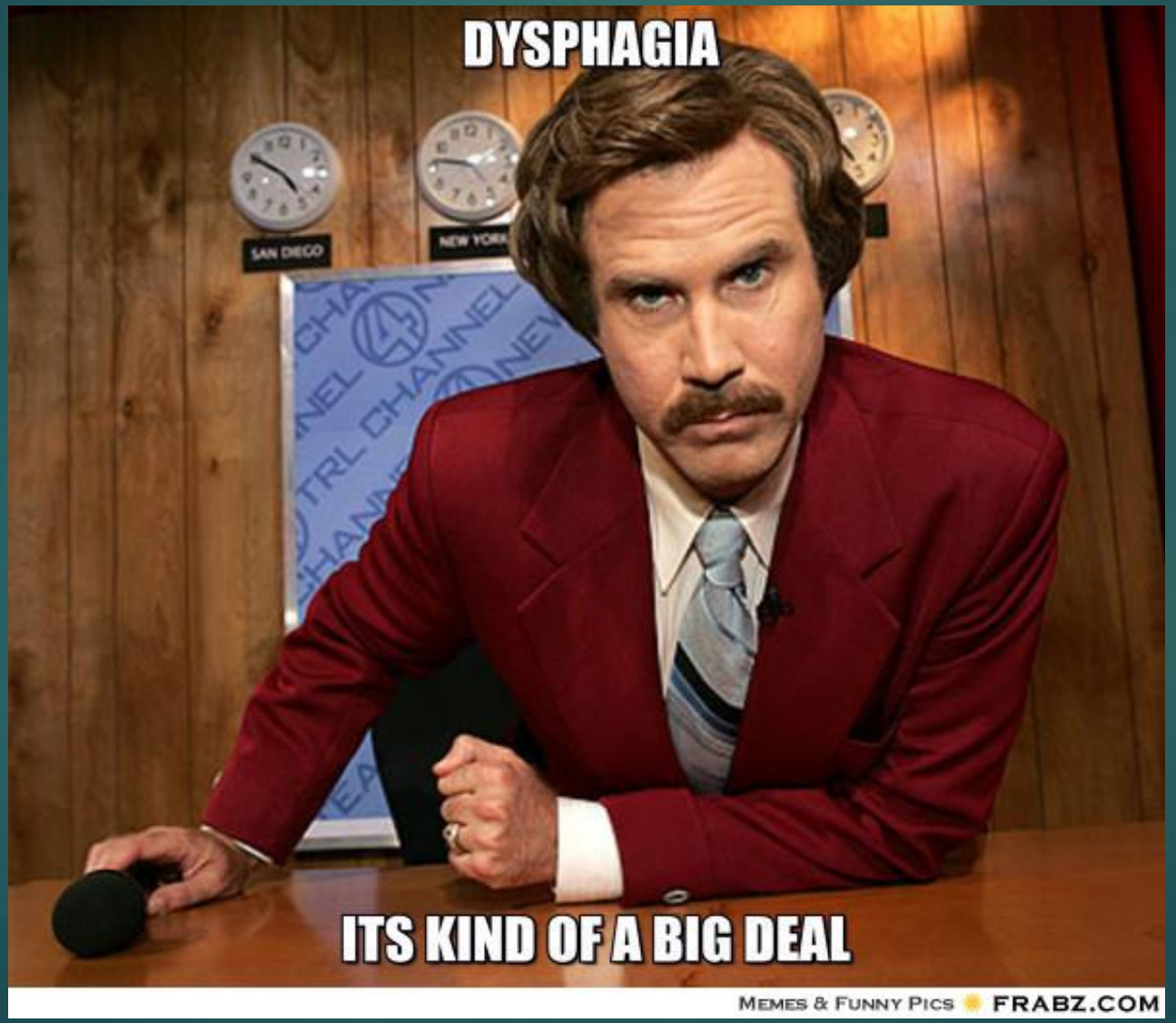
- Sensitive subject with families
- For the child who is unable to take adequate nutrition by mouth to support growth
- Some children may take trials of food
- Possible candidates:
  - Premature, anatomic abnormalities, neurologic disorders, pulmonary aspiration, failure to thrive…

Types of Feeding Tubes

- Nasogastric – through the nose, pharynx, and the lower esophageal sphincter into the stomach
  - More temporary
- Gastrostomy – Directly through the stomach
- Nasojejunal – through the nose, pharynx, the lower esophageal sphincter, through the stomach, and into the jejunum
  - Used as supplemental feedings for: severe reflux, cardiac conditions, and certain gastric disorders

My Experience

- Observe other clinicians who have feeding experiences
- Don’t be afraid to work on feeding
- Take classes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