EVIDENCE BASED PRACTICE FOR DYSPHAGIA INTERVENTION

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Objectives

- Examine the current literature available regarding effective interventions to remediate dysphagia
- Describe how evidence-based interventions can be used in clinical practice to improve the swallowing process across the lifespan
- Design an intervention plan using the client's strengths to support eating and feeding across various settings.
- Demonstrate several intervention techniques that can be used in the remediation of swallowing problems

Advanced Practice Requirements in California

- "Swallowing" as used in Code section 2570.3 is the passage of food, liquid, or medication through the pharyngeal and esophageal phases of the swallowing process.
- "Instrumental evaluation" is the assessment of any aspect of swallowing using imaging studies that include, but are not limited to, endoscopy and videofluoroscopy.
- Swallowing assessment, evaluation or intervention may be performed only when an occupational therapist has demonstrated to the Board that he or she has met the post professional education and training requirements established by this section as follows:

Advanced Practice Requirements in California

- Education: Completion of 45 contact hours in the following subjects:
  - (A) Anatomy, physiology and neurophysiology of the head and neck with focus on the structure and function of the aerodigestive tract;
  - (B) The effect of pathology on the structures and functions of the aerodigestive tract including medical interventions and nutritional intake methods used with patients with swallowing problems;
  - (C) Interventions used to improve pharyngeal swallowing function.
- Completion of 240 hours of supervised on-the-job training

Barry starts by prioritizing the day's necessities.

Four Phases of the Swallow

- Oral Preparatory Phase
- Oral Phase
- Pharyngeal Phase
- Esophageal Phase

Swallowing process – All phases

Graham builds a fox with his celery.

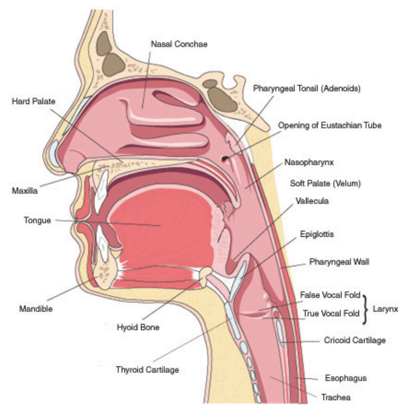
Example of Anticipatory Phase

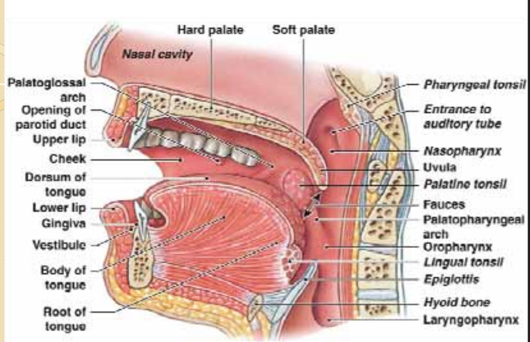
Anatomical Structures for Oral Preparatory Phase

- Muscles of the Face, Tongue, and Jaw
- Facial Muscles
  - Obicularis oris
  - Buccinator
  - Levator anguli oris/risorius
- Mastication
  - Temporalis
  - Masseter
  - Lateral and medial pterygoids
- Tongue
  - Intrinsic tongue muscles
  - Extrinsic tongue muscles

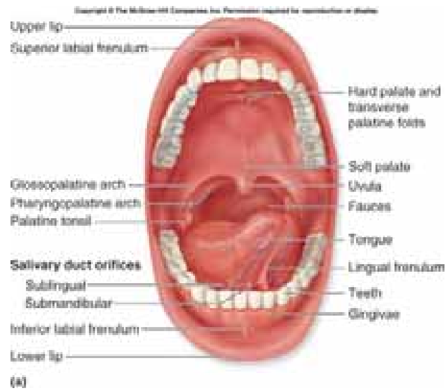
Review of Normal Anatomy and Physiology of the Swallow

- Oral preparatory phase
  - This phase is under voluntary control and requires task recognition, head and neck control, intact tongue, jaw and lip control.
  - The length of time for the oral preparatory phase varies depending on the consistency of the food
  - These actions are sometimes included as part of the oral phase
  - The duration of the oral preparatory phase varies depending on the resistive quality of the food and strength of chewing needed

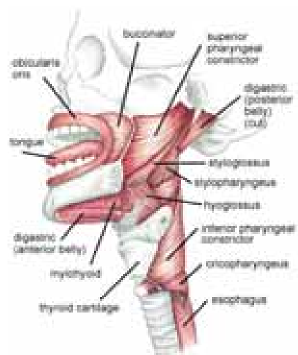




(a) Oral cavity, sagittal section



Facial Muscles



Muscles of mastication

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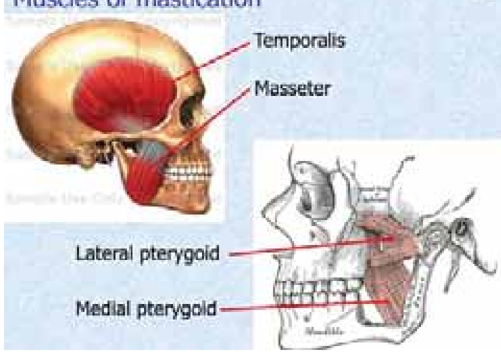
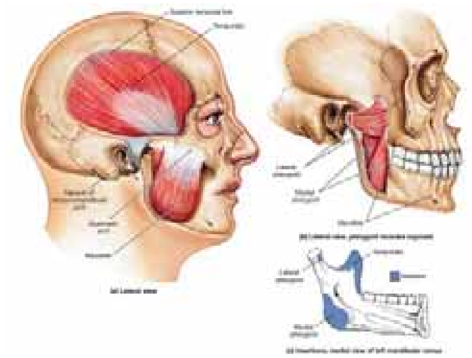


Muscles of Mastication



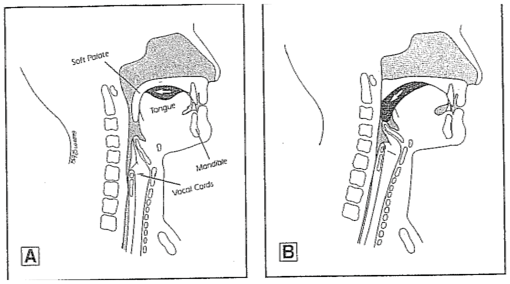
Review of Normal Anatomy and Physiology of the Swallow

- Oral phase
  - Requires: Intact labial musculature, intact lingual movement, intact buccal musculature, normal palatal musculature, and the ability to breathe comfortably through the nose
  - Typically respiration stops as the food moves posteriorly
  - The soft palate begins to flare and elevate
  - This phase is under voluntary control and typically lasts approximately 1 second

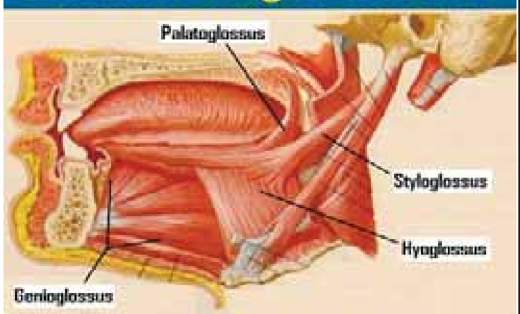
Review of Normal Anatomy and Physiology of the Swallow

- Oral phase
  - During this phase the bolus of food or liquid is propelled to the pharynx by the tongue
  - The tongue creates a trough to control the bolus
  - The tongue then flattens against the hard palate using a front to back motion to propel the bolus posteriorly

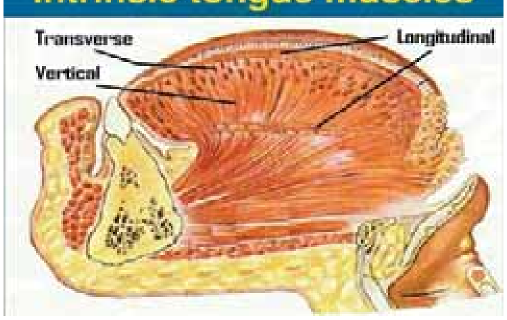
Oral Phase of Swallow



Extrinsic tongue muscles



Intrinsic tongue muscles



Anatomical Structures

- Structures of the Pharynx
- Pharyngeal arches (faucial arches, faucial pillars)
- Tongue (pharyngeal portion)
- Pharyngeal wall
- Valleculae
- Epiglottis
- Anterior to pharynx is the larynx and trachea
- Musculature of throat
  - Suprahyoids
  - Infrahyoids

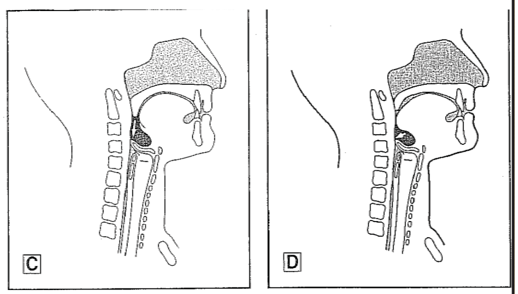
Review of Normal Anatomy and Physiology of the Swallow

- Pharyngeal phase
  - Swallow response occurs when bolus passes through faucial arches and the middle of the tongue base.
  - Respiration does not occur during this phase
  - Physiological activities:
    - Velopharyngeal closure (nasopharynx) to avoid nasal regurgitation
    - Elevation and closure of the larynx to avoid aspiration
    - Progressive top to bottom peristaltic action of the pharyngeal wall
    - Relaxation of the cricopharyngeal sphincter

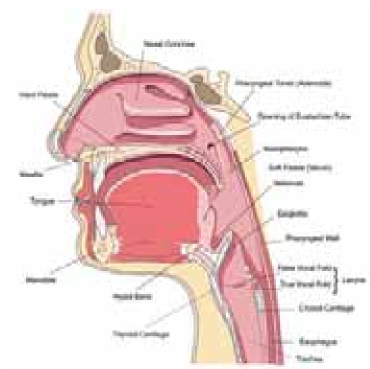
Review of Normal Anatomy and Physiology of the Swallow

- Pharyngeal phase
  - This is the phase where the “reflexive swallow” is initiated; this is considered the involuntary phase of the swallow
  - Ramping of the base of the tongue followed by tongue base retraction
  - This phase lasts approximately 1 second

Pharyngeal Phase of Swallow

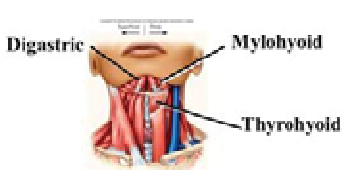


Structures of the Pharynx



Suprahyoid Muscles and Swallowing

- Digastric and Mylohyoid = open mouth
- Geniohyoid = widens pharynx during swallowing
- Stylohyoid = elevates hyoid
- Thyrohyoid = elevates larynx, closing glottis



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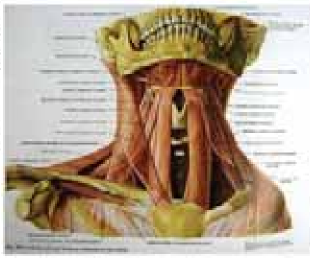
The Accessory Muscles of Mastication

- Othes muscles that active in mastication include the suprahyoid and infrahyoid muscles of the neck. Both groups of muscles are active in helping to depress the mandible.



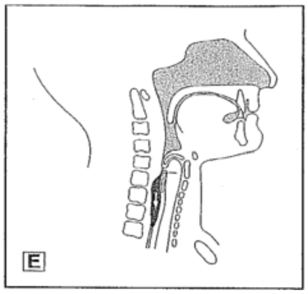
Anatomical Structures

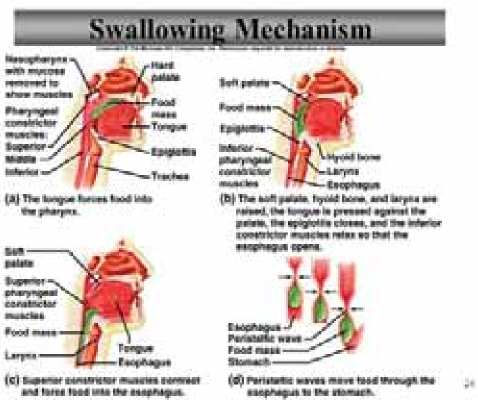
- Structures of the Esophagus
- Cricopharyngeal sphincter (upper esophageal sphincter)
- Lower esophageal sphincter

Review of Normal Anatomy and Physiology of the Swallow

- Esophageal phase
  - This phase is also involuntary during the process of swallowing
  - Peristaltic action propels the food through the esophagus to the stomach
  - At the onset of this phase the upper esophageal sphincter relaxes to allow food to pass into the esophagus
  - At the end of this phase the lower esophageal sphincter opens to allow food to pass into the stomach
  - The length of time varies depending on the viscosity of the food but typically is completed within 20 seconds

Esophageal Phase of Swallow





Video of normal swallow

- Speed of oral phase
  - After bolus is prepared the transit time is 1 second
- Speed of pharyngeal phase
  - Transit time is 1 second

Common anatomical & physiological problems during Oral Preparatory and Oral phase

- Oral Preparatory Phase
  - Poor oral motor control of bolus in oral cavity
  - Poor postural control to sustain safe eating
  - Problems with cognitive/perceptual function
  - Problems with dentation, tongue size, mandible
- Oral Phase
  - Poor tongue control of bolus
  - Extended oral transit time
  - Tongue size
  - Surgical resections

Common anatomical & physiological problems during Pharyngeal and Esophageal phase

- Pharyngeal Phase
  - Absent/delayed swallow reflex
  - Problems with laryngeal closure/elevation
  - Reduced pharyngeal peristaltic action
  - Cleft palate
  - Vocal fold paralysis
- Esophageal Phase
  - GERD along with sphincter dysfunction
  - Reduced esophageal peristaltic action
  - Obstruction and narrowing of esophagus

Videoflouroscopy – Abnormal Swallow

- 7 year old with history of pneumonia 2 - 3 times per year
- Look at transit during oral phase
- Look at transit during pharyngeal phase
- Pharyngeal residue after swallow

MBSS – 7 year old with CP

Videoflouroscopy – Abnormal Swallow

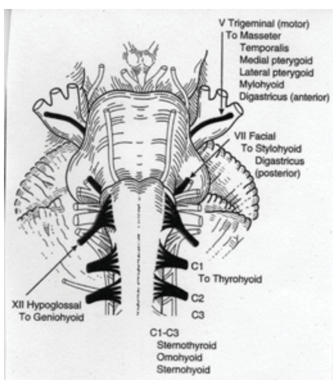
- Adult client
  - Assess oral transit
  - Assess oral residue
  - Assess pharyngeal transit
  - Assess pharyngeal residue

Adult MBSS

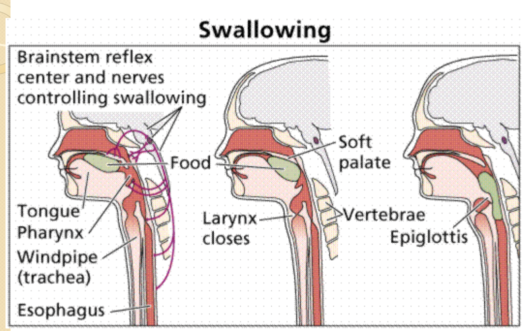
Etiology of Dysphagia – Physiological Cranial Nerves

- Motor
  - CN V Trigeminal
  - CN VII Facial
  - CN IX Glossopharyngeal
  - CN X & XI Vagus & Accessory
  - CN X Vagus
  - CN XII Hypoglossal
- Sensory
  - CN VII Facial
  - CN IX Glossopharyngeal
  - CN X Vagus
- Reflexive
  - CN IX Glossopharyngeal
  - CN X Vagus

Brainstem and location of cranial nerves



Cranial Nerves and Swallowing



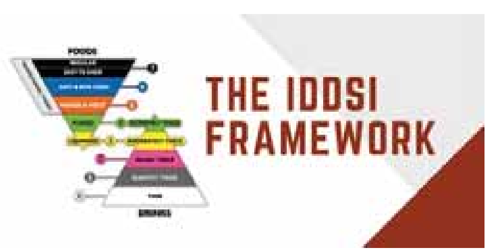
Central Pattern Generators

- Central pattern generators (CPG) are a neural network designed to produce a motor action without higher level CNS input
- Differentiated from reflexes that produce a specific response following specific sensory input; the CPG can occur without preliminary sensory input
- CPGs support the function of swallowing
- The CPG for respiration and swallowing interact

Evidence to support intervention

- Bolus size can impact energy expenditure and the total number of chews to prepare the bolus
- For healthy women, as the size of the bolus increased there was increased energy to prepare the bolus
- Consider bolus size to conserve energy and alter food resistive properties
  - Goto et al, 2015
- Reduction in pressure of the upper esophageal sphincter was seen in older healthy adults
- Longer pharyngeal transit time noted in older adults
- Provide sips of water to support pharyngeal phase
  - Nishikubo et al, 2015

International Dysphagia Diet Standardization Initiative (IDDSI)



IDDSI Framework

- Level O:
  - Characteristics:
    - Flows like water
    - Fast Flow
    - Can drink through any type of nipple, straw, spout as appropriate for age and skills
  - Functionality: Able to manage liquids of all types
  - Testing: Test liquid flows through a 10 ml slip tip syringe completely within 10 seconds with no residue

IDDSI Framework

- Level 1: Slightly thick
  - Characteristics:
    - Thicker than water
    - Requires more effort to drink compared to water
    - Flows through straw, syringe, teat/nipple
    - Similar thickness to commercially available anti-regurgitation infant formulas
  - Functionality: Predominantly sued in pediatric population
- Testing: Test liquid flows through a 10 ml slip tip syringe leaving 1-4 ml in syringe after 10 seconds

IDDSI Framework

- Level 2: Mildly Thick
  - Characteristics:
    - Flows off spoon
    - Sippable, but slower than thin drinks
    - Effort required to drink this from a standard straw
  - Functionality: control of flow for safety issues if delays noted with oral and/or pharyngeal phase
  - Testing: Test liquid flows through a 10 ml slip tip syringe leaving 4-8 ml in syringe after 10 seconds

IDDSI Framework

- Level 3: Liquidized/Moderately Thick
  - Characteristics:
    - Drink using a cup
    - Effort required when using standard or large bore straw
    - Cannot be eaten with a fork
    - Can be eaten with a spoon
    - No oral preparation (chewing) needed and can be swallowed directly
  - Functionality: If tongue control cannot manage Level 2 liquid, move to Level 3; allows increased time for oral prep phase; does require tongue propulsion effort
  - Testing: Test liquid flows through a 10 ml slip tip syringe leaving >8 ml in syringe after 10 seconds; runny rice cereal, runny pureed fruit, sauces

IDDSI Framework

- Level 4: Pureed, Extremely Thick
  - Characteristics:
    - Eaten with a spoon but possible to use a fork
    - Cannot be sucked through a straw; Does not require chewing
    - Falls off the spoon in a single shape; holds shape on plate
    - No lumps, not sticky
    - Liquid MUST not separate from solid
  - Functionality: Poor tongue control; no need for biting or chewing; can be used with missing teeth or poorly fitting dentures
  - Testing: Fork test – press a fork into the substance and the time marks remain, no lumps; spoon tilt test – food should slide off a spoon, in a cohesive unit, when the spoon is tilted with no stickiness and very little residue on the spoon

IDDSI Framework

- Level 5: Minced & Moist
  - Characteristics:
    - Eaten with fork or spoon or chopsticks
    - Can be scooped and shaped; soft & moist with no separate thin liquid
    - Small lumps visible
  - Functionality: Biting not required but slight chewing needed, tongue force alone can break this texture into smaller sections
  - Testing: Fork test – press a fork into substance and substance easily comes through the tines; easily mashed; cohesive on a spoon; spoon test – must slide off the spoon with very little residue on the spoon, not sticky; mashed or minced meats/fish, mashed fruit, thick cereal with small lumps, soaked bread (NOT regular bread)

IDDSI Framework

- Level 6: Soft & Bite-sized (appropriate for oral cavity)
  - Characteristics:
    - Eaten with fork, spoon or chopsticks
    - Can be mashed with utensils
    - Chewing required before swallowing, but no biting required; soft and tender but no separate liquid
  - Functionality: tongue force and control required during oral prep and oral phase to move the bolus
  - Testing: Pressure from fork/spoon to "cut" food; when pressing utensil into food with thumb, thumb nail blanches due to resistance from food; tender cooked meat/fish, casserole/stew/, mashed fruit, steamed vegetables

IDDSI Framework

- Level: Transitional foods
  - Characteristics:
    - Foods that start as one texture and change into another texture with moisture or temperature
  - Functionality: biting not required and minimal chewing needed; tongue can break apart food
  - Testing: after moisture or temperature is applied, food cannot be reformed; ice cream, sorbet, waffle cone, gelatin, Pringles, Veggie Sticks, baby "puffs"

IDDSI Framework

- Level 7: Regular Diet
  - Characteristics:
    - Normal everyday foods of various textures
    - Includes dual consistency foods (mixed consistency)
  - Functionality: Need to bite and chew foods without tiring, need to form foods into cohesive bolus to be swallowed; ability to sort foods in mouth (bone shard from meat; extremely fibrous vegetable from soft – artichoke)
  - Testing: Any foods – no test required

Incidence of Dysphagia

Bhattacharyya, 2014; Sato et al, 2013

- Incidence may be as high as 22% in those over 50 years of age
- Approximately 15 million Americans are evaluated each year with swallowing difficulties
- Swallowing difficulties negatively impact quality of life functioning
- Impaired swallowing can cause significant morbidity and mortality
- ***The presence of oropharyngeal dysphagia significantly increases healthcare utilization and cost*** (Attrill et al., 2018)

Dysphagia and normal aging

- Transit time increases with normal aging
- The retrusion (retraction of the tongue) does not appear to change in skill but diminished strength has been noted
  - Becker, Russell & Connor, 2015
- Protrusion of tongue diminish with aging
- Pharyngeal transit time is increased
- Less laryngeal excursion with older adults
- Traveling esophageal velocity pressure is decreased with aging marking it more difficult to propel the bolus to the LES
  - Nishikubo et al, 2015

Incidence of Dysphagia – Older Adult

(Aslam & Vaezi,2013; Bhattacharyya, 2014; Miller, 2013;)

- Approximately 15-22% of adults older than 50 years have swallowing difficulties, although this number may be artificially low because many patients with this problem may never seek medical care. Of those over age 60, approximately 14% of individuals are affected by dysphagia

Incidence of Dysphagia – CVA
(Arnold, et al, 2016; Daniels et al, 2012;;Takizawa et al., 2016)

- Studies on the prevalence of dysphagia range from 30%-70% in clients who have experienced stroke. Estimates vary because of the method of assessing swallowing function, the timing of swallowing assessment after stroke, and the number of and type of clients studied
- Although dysphagia improves in most clients post-stroke, many have persistent swallowing difficulties, with up to 50% of individuals continuing to have dysphagia upon hospital discharge

Incidence of dysphagia – Alzheimer's Disease (Affoo et al, 2013; Sato et al, 2014)

- Alzheimer's Disease
  - With deterioration to the autonomic nervous system the coordination is often compromised during the oral preparatory, oral and pharyngeal stages of the swallow
  - A systematic review of the literature revealed that dysphagia occurs in the early stages of AD
  - Dysphagia increases in severity of AD increases
  - Thickened liquids eliminate thin-liquid aspiration in individuals with AD
  - Appropriate head and neck posture improves oral phase
  - Pneumonia accounts for 70% of causes of death
  - Cerebrocortical atrophy negatively impacts initiation and modification of swallow force in response to bolus size and viscosity

Incidence of Dysphagia – Parkinson's Disease
(Argolo et al, 2013; Baijens & Speyer, 2009, Leow et al, 2010; Plowman-Prine et al, 2009, Regan et al, 2010; Suttrup & Warnecke, 2016;Takizawa et al., 2016)

- Clients with Parkinson's disease not only experience dysfunction of the various phases of swallowing, but they also have great difficulty in their ability to feed themselves
- Dysphagia is reported by 20%-40% of clients with idiopathic Parkinson's disease
- Oral motor exercises improve swallowing function for client's with Parkinson's disease
- Thermal-tactile stimulation reduces the delay in initiation of the pharyngeal phase of the swallow

Incidence of Dysphagia – Huntington's Disease (Heemskerk et al, 2011; Ohlmeier, et al., 2019)

- Dysphagia is a common symptom that may be associated with fatal complications
- Dysphagia hinders nutritional intake and places the patient at risk for aspiration
- Dysphagia is related to diminished control during the oral phase in almost all clients with HD as the diseases progresses
  - Faster than typical oral transit phase
  - Impulsive behaviors
- Dysphagia is also noted in the pharyngeal stage for many clients as the HD progresses
  - Poor epiglottis closure
  - Prolonged elevation of the larynx
  - Residue after initiation of pharyngeal phase

Incidence of Dysphagia – MS

(Alali et al, 2016; Alfonsi et al, 2013; Poorjavad et al, 2010)

- Clients with multiple sclerosis (particularly those with brainstem involvement) are reported to have swallowing difficulties. Dysphagia may develop early or late in the disease's process.
- Over 30% of individuals with multiple sclerosis experience swallowing problems
- Problems most often seen in oral and pharyngeal phases
  - Poor tongue control during oral transit
  - Poor coordination of musculature during pharyngeal phase
- Coordination of the suprahyoid muscles was compromised on electrophysiological studies as was the duration of pause for the cricopharyngeal muscles – extended time compromised the transition from the pharyngeal phase to esophageal phase

Incidence of Dysphagia – TBI

(Morgan 2010; Takizawa et al., 2016; Toyama et al, 2014; Ward et al, 2007)

- Incidence of dysphagia in individuals with traumatic brain injury vary greatly depending on whether the population studied is comprised of clients with severe TBI, consecutive brain injury admissions, clients with acute TBI, or clients in the rehabilitation phase of recovery
- Most clients with a TBI have dysphagia during the first two weeks following injury and typically dysphagia resolves within five months of the injury
- To hasten the appropriate excursion of the hyoid bone and larynx during the swallowing process neuromuscular electrical stimulation (NMES), used on the suprahyoid muscles, was successful in fostering more appropriate swallowing process. This was combined with thermal-tactile stimulation to faucial arches to achieve results.

Incidence of Dysphagia – CP

(Benfer et al, 2013; Benfer et al, 2014; Calis et al, 2008; Clancy et al, 2011; Gisel et al, 2003; Morgan et al, 2012; Motion et al, 2002)

- Feeding problems are seen in 38% - 57% of children diagnosed with cerebral palsy (CP) during the first year of life
- Children with more severe forms of CP have a much higher rate of dysphagia with swallowing problems seen in over 90% of clients
- Dysphagia identified in all phases of swallowing process – oral preparatory, oral, pharyngeal, and esophageal
- Dysphagia continues in many of these children throughout their lifetime and presents as a persistent compromise to nutritional status
- Even children with mild CP can display dysphagia and the severity of gross motor problems is associated with increased rate of dysphagia

Incidence of Dysphagia – Pre-term Infants

(Benfer et al, 2013; Benfer et al, 2014; Calis et al, 2008; Clancy et al, 2011; Fucile et al, 2012; Fucile et al, 2011; Hwang et al, 2010; Morgan et al, 2012; Morgan et al, 2012)

- Premature infants are typically dependent upon the use of G or NG tube feedings for nutritional support and have not developed the suck-swallow-breath coordination of a full-term infant
- Preterm infants: typical suck-swallow-breathe pattern is not developed until 37 weeks GA
- Bottle/breast feeding may be seen at 34-36 weeks gestational age but swallow is poorly coordinated
- Dysphagia often persists beyond the time when the infant has reached full-term
- Diminished development of hunger-satiety with tube feedings since continuous feeds are most common

Incidence of dysphagia – Developmental Delay

(Hashimoto et al, 2014; Jackson et al, 2016; Morgan et al, 2012; O'Neill & Richter, 2013)

- Oral preparatory deficits are frequent in children who have Down syndrome and the ability to effectively grind foods is compromised
- Oral phase deficits are very common and due to poor tongue control of bolus and poor oral transit time
- Poor tongue pressure noted during the oral phase to propel food posteriorly and due to poor tongue control and short, narrow palate
- Over 50% of children diagnosed with Down syndrome display pharyngeal dysphagia

Interventions: Positioning

- Positioning - 75% of eating intervention is positioning
  - Chin tuck (Shannahan et al, 1993)
  - Head turn – unilateral problems (CVA) and turn head towards involved side (Mayer, 2004; Palmer et al, 2000)
  - Head tilt – unilateral problems (CVA) and tilt head away from involved side (Mayer, 2004; Palmer et al, 2000)
  - Pelvic position – neutral alignment, even weight bearing
  - Body positioning - symmetrical

Modification to Volume, Rate and Placement of Food

- Variations in sensory
  - Offering ice chips or cold fluids between solids
- Pacing
  - Speed of presentation
  - Hunger/satiety paradigm
- Placement
  - Position of food within oral cavity
- Flipped spoon
  - Placing spoon in mouth and then flipping over to deposit food on tongue

Evidence to support intervention

- Use of carbonated thin liquids was compared to non-carbonated thin liquids for adults with neurogenic dysphagia
- Use of carbonated thin liquids significantly decreased the penetration and aspiration upon videofluoroscopy
- No significant change in oral transit or pharyngeal transit
  - Sdravou et al, 2012

Interventions – flipped spoon

- Flipped spoon technique was found to be effective in a pre-test/post-test design for children with developmental delays and oral preparatory/oral phases of the swallow
- Often used for children who pack foods in the cheeks and lack the tongue control to maneuver the bolus
- Collect the bolus onto the spoon
- Insert the spoon into the child's mouth
- Flip the spoon over, open bowl side on the tongue and deposit the food on the tongue while applying slight downward pressure on the middle of the tongue
- Maintain pressure on the tongue as you pull the spoon out of the mouth
  - Rivas et al, 2011; Volkert et al, 2011

Interventions

- Use of Cheek and Jaw support
  - Support provided by placing fingers on either side of the infant's cheeks
  - Provide slight pressure inward and towards the corners of the lips
  - Bottle/nipple presented in midline
  - Technique improved oral intake for pre-term infants
- Hwang et al, 2010

Interventions

Pre-term infants (Fucile et al, 2012)

- Transition to oral feeds can be enhanced through oral and sensory interventions
- 75 pre-term infants (ave. 29 weeks GA)
- Randomly assigned to 3 intervention groups and 1 control
- Intervention groups:
  - Oral sensory input to the oral region
  - Tactile/kinesthetic stimulation to trunk and limbs
  - Combined use of both of the above interventions
- Outcomes:
  - Oral sensory group showed more advanced sucking skills with greater suction and amplitude than controls
  - All 3 interventions improved the respiratory support for the swallow-respiration sequence

Pre-term infants (Fucile et al, 2011)

- Outcomes:
  - All 3 intervention groups transitioned to oral feeds faster than control by 9-10 days,
  - Oral and non-oral sensorimotor interventions (i.e. oral and tactile ⁄ kinesthetic) accelerated the transition from introduction of oral feeding to independent oral feeding and enhanced oral feeding skills.
  - Sensorimotor interventions (tactile ⁄ kinesthetic) had beneficial effects beyond the specific targeted system.
  - Combined (oral+tactile ⁄ kinesthetic) sensorimotor intervention had an additive⁄synergistic effect on oral feeding performance over single sensorimotor interventions

Extra-oral facilitation

- Vibration to suprahyoids
  - Provide stimulation to the muscles to elevate the larynx during the swallowing process
  - Uses the same musculature involved with VitalStim but uses finger tips instead of electrical stimulation
- Vitalstim (Carnaby-Mann & Crary, 2007)
  - Electrical stimulation to the musculature to elevate the hyoid and larynx
  - Uses specialized electrodes
  - Gains noted in small studies, most often single subject design
- Oral motor exercises of lips, tongue & jaw (Kang et al , 2012)
  - 50 clients 6 mo post-CVA with dysphagia enrolled in an investigation
  - 25 in conventional tx of thermal-tactile stimulation, 25 in conventional tx plus specific daily exercises to lips, tongue and jaw
  - Each group seen daily for 2 mo (in Korea)
  - The group receiving thermal-tactile stim coupled with the oral motor exercises had significantly improved oral transit time but there was no difference between groups for the pharyngeal phase

Shaker Exercise

- The Shaker Exercise (Shaker, 1997), also called the Head Lift, is indicated for clients who exhibit reduced superior and anterior movement of the hyolaryngeal complex. It is used to increase the upper esophageal sphincter (UES) opening.
- This results in residue in the pyriform sinuses, placing the client at risk to aspirate this material.
- The client lies in supine and lifts their head to "look at toes". Position is held for 1 minute, rest for 1 min. for 3 repetitions followed by 30 repetitions of head lifts

Shaker exercise

EBP – Shaker Exercise

- RCT where one group had Shaker exercise and the other group had traditional pharyngeal exercises of elevating the larynx and tongue exercises (Logemann et al, 2009)
- Each group had outpt. SLP services 2X/week for 6 weeks and completed the exercise program at home with monitoring for compliance
- Only 9 clients in control and 5 in Shaker group completed both pre-test/post-test measures
- Both groups improved in the UES opening
- Clients who used the Shaker method and had fewer episodes of post swallow aspiration than the group who used traditional exercises

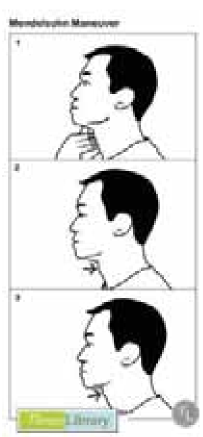
Chin Tuck Against Resistance

- Exercise to strengthen the suprahyoids
- CTAR found to more specifically target the suprahyoid muscles (Sze, et al. 2016)

Mendelsohn Maneuver

- This exercise is done to elevate the larynx and increase the duration of cricopharyngeal opening
- Swallow your saliva several times and pay attention to your neck as you swallow.
- Feel your larynx lift and lower as you swallow.
- Now, swallow and feel your larynx lift but do not let it drop. Hold it with your muscles for 2 seconds. Release and then repeat 5 times.

Mendelsohn Maneuver



EBP – Mendelson Maneuver

- Prospective cross-over study of 18 post CVA clients showed gains in extent of hyoid movement and UES opening and improvements in coordination of structural movements (McCullough & Kim, 2013
- Results from other studies show increased hyoid movement and UES opening (McCollough et al., 2012)

Intervention – Masako Maneuver

Protrude your tongue from your mouth (stick out your tongue), hold your tongue between your teeth and then swallow
Exercise to improve laryngeal elevation during swallow

EBP – Masako Maneuver

- Significant effects on the improvement of swallowing function for the patients with dysphagia caused by stroke by improving strength of tone base movement (Byeon, 2016)

Tactile Stimulation to the Tongue

- 45 children with various congenital anomalies and gastroenterologic dysfunctions
- All received artificial feedings
- All children had significant difficulties with configuration of the tongue to support the oral phase of the swallow
- All children were able to transition to oral feeds following 5-7 days of treatment
  - Lamm et al, 2005

Facilitation of masseter and pterygoids

- Gloved hand
- Index and middle finger
- Squeeze fingers laterally together
- Provide slight shaking as you withdraw finders from the side of the cheek

Clinical Intervention during Phases of Swallow

- Thermal-tactile Stimulation
- *Purpose*: to increase the sensory awareness in the oral cavity prior to the
- swallow and to decrease the delay between the oral and pharyngeal swallow.
- *Technique*: 00 laryngeal mirror is used to stimulate the faucial arches 4 or more times in rapid succession followed by the command "swallow".
- (Rosenbeck et al , 1991; 1996; 1998; Park et al, 2010)

Thermal-tactile Stimulation

EBP – Tactile Thermal Stimulation

- There is low-level evidence to support the use of TTS. Current best practice would be to use TTS on a case-by-case basis, following detailed instrumental assessment and evaluation of its efficacy for an individual (Schwartz et al., 2018)

Aspiration after the swallow	Mendelsohn maneuver – keeps larynx (Lx) elevated for a longer period of time Effortful swallow – improves bolus clearance from valleculae Double swallow – clears residue Shaker maneuver – increase Lx excursion and increased duration of UES opening
Aspiration after the swallow – scattered stasis	Effortful swallow – improves bolus clearance from valleculae Mendelsohn maneuver – keeps Lx elevated for a longer period of time for better airway protection Supraglottic swallow
Aspiration during the swallow- reduced protection of the airway	Chin tuck – bolus will rest in valleculae to avoid falling into the airway Mendelsohn maneuver Supraglottic swallow Shaker swallow
Aspiration during the swallow plus webbing	Mendelsohn maneuver Supraglottic swallow Shaker swallow Effortful swallow

Problems can be seen during the oral-preparatory phase but not the focus of this presentation!

Gary is in the first few hours of his fast.

Clinical Intervention during Oral Phases of Swallow

- Identify a client (dx) who would have problems with the oral phase of the swallow
- Identify intervention methods that could be used to foster improved oral skills
- Consider interventions for Oral Phase that address:
  - Sensory issues to detect the position of the bolus
  - Motor control of the tongue to propel the bolus
  - Physiological issues related to respiration support

Clinical Intervention during Oral Phase of Swallow

- Intervention strategies for the oral phase
  - Food consistencies
  - Rate of food presentation
  - Positioning
  - Motor facilitation for tongue
  - Oral motor exercises
  - Thermal stimulation to facilitate a swallow
  - Vibration to suprahyoids

Clinical Intervention during Pharyngeal Phase of Swallow

- Identify a client (dx) who would have problems with he pharyngeal phase of the swallow
- Identify intervention methods that could be used to foster improved pharyngeal skills
- Consider interventions for the Pharyngeal phase that address:
  - Physiological issues of closure of larynx by epiglottis
  - Poor force of peristaltic action of pharyngeal wall
  - Poor coordination of swallow and breathing
  - Spontaneous swallow frequency rate
    - (Crary, Sura & Carnaby, 2013)

Clinical Intervention during Pharyngeal Phase of Swallow

- Intervention strategies for the pharyngeal phase
  - Positioning
  - Thermal stimulation to facilitate initiation of swallow
  - Vibration to suprahyoids
  - Effortful swallow
  - To clear residual food, use alternating temperatures (ice chips contrasted with foods)
  - Effortful swallow
    - (Leder et al. 2013; Nakayama et al. 2013; Park et al. 2012)

Clinical Assessment and Intervention during Phases of Swallow

- *Oral motor Exercises*
- *Purpose*: to increase ROM, strength, coordination
- *Technique*: Use of quick stretch, 3 repetitions, to obicularis oris, tongue, suprahyoids, masseter; also use of chewy foods or items to increase strength and control for muscles of mastication; ROM exercises; chewing on plastic straws

Intervention – tongue strengthening

Have client protrude tongue and push against tongue blade

Ask client to push as the client or therapist counts 10 seconds

Repeat 3 times twice a day

A toothbrush head can be substituted for the tongue blade if asking the client to perform this exercise at home

Intervention

- Tongue exercises
  - Use of an ice straw to foster lateralization
  - Ice straw to foster trough in tongue
- Repeated exercises can produce changes in corticomotor regions
  - Komoda et al, 2015
- Tongue exercises can improve oral phase of the swallow
  - Carnaby-Mann & Crary, 2010

Clinical Assessment and Intervention during Phases of Swallow

Effortful Swallow

- *Purpose*: To improve tongue base retraction and reduce residue in the valleculae after the swallow.
- *Technique*: Ask the patient to "swallow normally" but to squeeze hard with the tongue and throat muscles throughout the swallow.

Combining this maneuver with the chin-down posture will aide in pushing the tongue base posteriorly and improving pharyngeal pressure and peristaltic strength.

Clinical Intervention during Phases of Swallow

- NMES **combined with** traditional swallowing therapy is significantly better than use of traditional swallowing therapy alone to improve coordination of swallowing for patients with acute/subacute stroke
- Traditional swallowing therapy included:
  - Thermal-tactile stim, tongue exercises, effortful swallow, Mendelsohn and Masako maneuver and Shaker exercises

Clinical Intervention during Phases of Swallow

- Neuromuscular electrical stimulation (NMES) with traditional swallowing therapy
- RCT with over 25 in each group
  - NMES (VitalStim) on infrahyoids with effortful swallow
  - Control group had electrodes placed with insufficient stimulus to produce muscular action
  - All had oral motor exercises
  - Outcome measure – excursion of the hyoid bone during swallow as a measure of control and power
  - Kim et al, 2014; Park et al, 2016

Clinical Intervention during Phases of Swallow

Fig. 2. Application of electrodes in the infrahyoid area targeting the sternohyoid muscles.

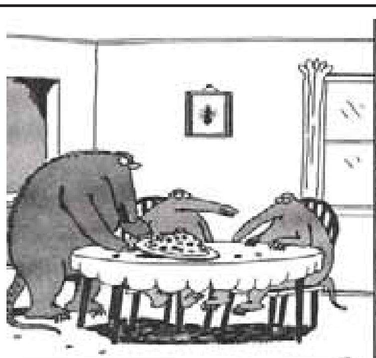
Electrodes were placed on both experimental and control group participants, the NMES was insufficient to produce muscular contraction for control group (placebo)
All participants had oral motor exercises using the effortful swallow exercise
Significant improvement in hyoid excursion noted in the experimental group

Clinical Intervention during Phases of Swallow

- *Vibration to suprahyoids*
- *Purpose*: to increase the motor control of suprahyoids to propel the bolus posterior and decrease the delay between the oral and pharyngeal swallow.
- *Technique*: place fingers on the suprahyoids and quickly vibrate for 1-2 seconds

Objectives

- Examine the current literature available regarding effective interventions to remediate dysphagia
- Describe how evidence-based interventions can be used in clinical practice to improve the swallowing process across the lifespan
- Design an intervention plan using the client's strengths to support eating and feeding across various settings.
- Demonstrate several intervention techniques that can be used in the remediation of swallowing problems



"OK, kids, here we go. ... And I believe Danny's right, Randy—it's his turn to eat the queen."

Questions??

Thank you!

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2020 Western Regional OT Conference – March 7, 2020
Evidence Based Interventions for Oral and Pharyngeal Dysphagia – Session #23, 2 hour

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