Learning Outcomes

1. Describe three evidence-based dysphagia practices applicable to pediatrics and/or adults.

2. State three essential evidence-based or person-centered care activities NOT typically included in most workplace productivity formulas (e.g. non-billable activities).

Themes

- #1 Pediatric dysphagia (232 replies) and #9 pediatric feeding
- #7 and #12 Productivity (84 replies)
- #21 Moving to National Dysphagia Diet (IDDSI)
- #33 Thickening formula with rice cereal
- “Normal”/typical findings (varies across age spectrum)
  - Prompted by 2020 thread about significance of penetration in infants

Final list...

- Across the age spectrum
  - Productivity
  - IDDSI
  - Thickening
  - “Normal” findings
"Person-centered care" means that **individuals' values and preferences are elicited** and, **once expressed**, guide **all aspects of their health care**, supporting their **realistic health and life goals**. Person-centered care is achieved through a **dynamic relationship** among individuals, others who are important to them, and all relevant providers. **This collaboration informs decision-making to the extent that the individual desires.** (J Am Geriatr Soc 64:15–18, 2016.)
How familiar are you with this topic?

1. I don't know what the term productivity relates to in the context of the workplace for SLPs

2. I am very familiar with what the term productivity relates to in the context of the workplace for SLPs

Definition

- Productivity is defined by Merriam-Webster (2019) as “the state of being productive,” or “yielding results, benefits, or profits.”

- In healthcare settings, the term currently often refers only to billable activities or activities that yield profit for an organization.
As a result...

- Many organizations have developed productivity formulas and requirements
  - e.g. "85% of the minutes you spent at work must be spent doing billable activities"
- Employees' ability to meet those requirements is often tracked

Why does this topic matter?

- Impact employee health and well-being
- Impact patient care

An example

- At 85% productivity SLPs in an eight-hour day, leaves 72 minutes to complete nonbillable tasks
  - In 72 minutes
    - Document/Finish documentation
    - Plan treatment
    - Consult with other professionals
    - Educate patients and families (e.g. calling)
    - Physically get to each patient
    - Use bathroom
    - Conducting/attending in-services
    (Cutter & Plovoy, Under Pressure, 2014)
- At 90% productivity SLPs in an eight-hour day, leaves 48 minutes to complete nonbillable tasks.
- At 95 percent productivity SLPs in an eight-hour day, leaves 24 minutes to complete nonbillable tasks. ("Why Some SLPs Work Off the Clock")

ASHA has been talking about the impact of productivity on SLPs for a while

2019 SLP Health Care Survey: Practice Issues

- 61% of SLPs in all settings had a productivity requirement (2019 survey)
  - 64.2% of SLPs in all settings (2017 survey)
  - 59.6% of SLPs in all settings (2015 survey)
- 94% of SLPs in SNFs (95%) had productivity requirements
- Average productivity requirement was 79%
  - 68% in pediatric hospitals- 84% in SNFs.
- 69% of SLPs said only time with patients counted toward productivity calculations
- 25% of SLPs typically performed "off the clock" work
  - 2017 report: 27%
  - 2015 report: 32%
- 14% felt pressured to discharge inappropriately or provide inappropriate frequency or intensity of services
  - 7% in outpatient to 31.9% in SNFs (2017)

Abstract

This study surveyed speech-language pathologists (SLPs) working in healthcare settings regarding productivity requirements in the workplace. Responses from 211 SLPs were obtained. The majority of SLPs (78%) reported having productivity requirements at their workplace. Much variation, however, in required rates and productivity formulas was evident. Most SLPs reported that time spent with patients counted in productivity formulas. Required rates were most often reported as a percentage with the rate of 75% being the most common, though some reported rates up to 100%. Regarding the impact of those requirements, 58% reported “always” or “frequently” feeling pressure to meet productivity requirements. 31% reported “always” or “frequently” feeling that such requirements negatively impacted implementation of evidence-based practice. 37% reported “always” or “frequently” feeling that requirements negatively impacted implementation of person-centered care. The profession is in need of solutions to address these pressures and their potential impact on patient care.

Survey question #21

Helpful suggestions I have received for improving productivity (please answer even if you answered no to having a productivity standard) are:...

Arp, Recker & Becker, 2021

- Point of care
- Other documentation strategies
- General efficiency of employee
- Scheduling
- Support staff/Top of license
- Off the clock
- Billing strategies
- Grouping
- Increasing caseload
- General comments
- Organizational practices
- Unethical clinical practices
• "Good" suggestions
  - efficiency of practices: continuity of therapists, organized, to floors quickly, strategic scheduling considerations
  - documentation strategies: templates for charting, concise documentation/document main points, pre-write, copy and paste from prior notes
  - There were some "bad" suggestions
  - Arise from being discouraged to complete vital activities, because they are non-billable activities
  - Negatively impact implementation of EBP and PCC

- Do productivity requirements negatively impact implementation of EBP?
  - "Cut down on chart review time"
  - "Less standardized testing"
  - "Have patient do a cog worksheet while charting"
  - Not review MBSS recording or analyze frame-by-frame

- Do productivity requirements negatively impact implementation of PCC?
  - "Treat a patient while they are toileting."
  - "When staff or family asks a question, respond only if the patient is in line of sight...so I can bill for it."
  - "Bring patients with you wherever you go"
  - "See higher acuity patients for longer periods of time"
  - Document in the doorway, so you can "count" it as treatment

• Complete documentation for evaluation, treatment sessions, discharge summaries, weekly progress notes, 30-day recertifications and other patient activities
  - File or send copies of documentation
  - Plan treatments
  - Conducting/attending in-services
  - Read chart, (H/P, physician therapy notes, reports from modified barium swallow studies, prior speech-language treatment, gastroenterology, otolaryngology and other specialists).
  - Attend care plan meetings with families, nurses, social worker, physician and others.
  - Attend therapy team meetings to collaborate to improve patient outcomes
  - Solve behavior and communication challenges/train staff to implement strategies
  - Troubleshoot computer and documentation software issues
  - Copy and prepare materials for treatment.
  - Read e-mail and written notes from managers/organization
  - Physically get to each patient

(Cutter & Polovoy, Under Pressure, 2014)

- Improving reliability among colleagues (MBS, FIMS)
  - Locate and print educational materials
  - Review MBSS sufficiently
    - Frame by frame
      - Respondents reporting consistent use of frame-by-frame analyses were much more able to accurately differentiate complex swallowing events as normal or impaired (Vose et al., 2018)
    - Standardized protocol (MBSImP)
      - Assisting/answering questions of colleagues/managers
      - Office tasks (e.g. due to reductions in secretarial staff), like answering the phone; copying forms
    - Professional growth activities (panel case reviews, grand rounds)
      (Becker, 2021)

- Counsel patients and families about the nature of deficits, prognoses, alternatives
- Individualizing materials (including communication boards, home practice/program)
- Point of care documentation not always possible (e.g. high acuity patients or those requiring full attention, e.g. severe aphasia requiring eye contact; agitated patients) hands on procedures, e.g. swallowing evaluation, speaking valve trials, isolation precautions
- Scoring standardized tests
- Reviewing literature relevant to specific patients (unusual condition; area with lots of research)
- Regarding AAC: educate staff, assist with positioning, calibration of device and utilizing correct mounting systems.
  (Becker, 2021)
Increase awareness of the topic among all stakeholders
- Discuss the impact on patients and employees
  - Speech-language pathologists
  - Other healthcare professions
  - Administration
  - Students
- Address unrealistic/harmful productivity standards
  - Use networks, associations, and groups
    Contact your professional association for guidance
  - AOTA, APTA, and ASHA joint statement
  - Contact the corporate compliance officer
  - Office of Inspector General or CMS, if the compliance officer has not responded appropriately
    - OIG has a hotline for reporting fraud anonymously
  - Iowa’s State Advocates for Reimbursement (STARs)
  - Ombudsman

Recent changes in reimbursement models may positively impact unrealistic productivity requirements
- Patient Driven Payment Model (PDPM) a case-mix classification system where reimbursement is based on patient conditions and needed care; in effect Oct. 1, 2019
- Patient-Driven Grouping Model (PGPM) Medicare home health payment system in effect Jan. 1, 2020, reimburses based on patient characteristics, rather than number of therapy minutes.
- We were just learning about the impact of these new systems, when COVID arrived.

Most are familiar with National Dysphagia Diet (NDD) labels
- Published in 2002 by the American Dietetic Association
- Thin liquids (1-50 cP)
- Nectar consistency liquids (51-350 cP)
- Honey consistency liquids (351-1750 cP)
- Pudding/Spoon-thick consistency liquids/”spoon thick” (>1750 cP)
In 2012 a multidisciplinary group of volunteers (including nutrition & dietetics, medicine, speech pathology, occupational therapy, nursing, patient safety, engineering, food science & technology) came together to discuss developing international standardized terminology and dysphagia definitions.

- Many countries use their own terminology to label and define levels of texture modification
- Standardized terminology facilitates improved communication and collaboration between health professionals
- enhances patient safety

In 2015, the International Dysphagia Diet Standardisation Initiative Framework (IDDSI) was published.

- In 2016, American Speech-Language Hearing Association (ASHA) passed a resolution to support the IDDSI Framework
- In January 2017: The Academy of Nutrition and Dietetics and ASHA jointly announced their support of this new global initiative
- The Academy of Nutrition and Dieterics announced it would implement the global initiative May 1, 2019
- Support has come from many others, including:
  - Dysphagia Research Society
  - National Foundation of Swallowing Disorders
  - Hormel
  - Campbell’s
  - Simply Thick...

Manufacturers are beginning to dual label their products to include IDDSI terminology

IDDSI Flow Test

It is recommended to use another syringe to do this
Remember...
• “Fill to 10.
• Drain for 10.”

http://iddsi.org/framework/drink-testing-methods/

Use a syringe (following syringe dimensions image below) for correct results.

• National Dysphagia Diet was proposed in 2002 (developed by ADA, not ASHA)
  • Level 1: Dysphagia Pureed/NDD1
    • Homogeneous, very cohesive, pudding-like, no chewing required
  • Level 2: Dysphagia Mechanically Altered/NDD2
    • Cohesive, moist, semi-solid foods; requires chewing ability
    • No vegetables or fruits with skins
  • Level 3: Dysphagia Advanced/NDD3
    • Soft-solid foods that require more chewing ability
    • No nuts, raw vegetables
  • Level 4: Regular/“General”
    • All foods allowed

Foods

DRINKS
Copyright: The International Dysphagia Diet Standardization Initiative 2019 @ https://iddsi.org/framework
Various tests may be required to determine a food category. Methods include:

- Fork Drip Test
- Spoon Tilt Test
- Fork or Spoon Pressure Test
- Chopstick Test
- Finger Test

**Foods**

- No chewing and no bolus formation skills needed
- Level 4: Pureed
- Level 5: Minced and Moist
- Level 6: Soft and Bite-sized

**Level 4: Pureed**

- Adult: maximum food sample of 1.5x1.5 cm
- Pediatrics: 8 mm x 8 mm
  - Each lump must fit through the tines of the fork!

**Level 5: Minced and Moist**

- Soft and moist with no separate thin liquid
- Small lumps visible within the food
  - *Pediatric, 2 mm lump size*
  - *Adult, 4mm lump size*
- Lumps are easy to squash with tongue

**Level 6: Soft and Bite-sized**

- Must be "bite-sized"
- Adults: maximum food sample of 1.5x1.5 cm
  - (15 mm x 15 mm) (i.e. width of adult human thumb or entire width of a standard fork)
  - Pediatrics: 8 mm x 8 mm
  - (Berzlanovich et al., 2005; Bordsky et al., 1996; Litman et al., 2003)
- Chewing is required, but must be "soft"
Level 7: Regular
- No texture or size restrictions
- Bread is only allowed with Level 7
  - “It is a huge choking hazard...we process bread less than other foods which is where the risk lies...this (restriction to Level 7) is causing shock” – Catriona Steele

“Transitional foods”
- Foods that start as one texture and change to another with moisture or temperature
  - E.g. Potato crisps (e.g. Pringles), waffle cones, ice, ice cream, Cheeto Puffs, Baby Mum Mums, Gerber Graduate Puffs
- Tested with fork pressure test after applying
  - Temperature
  - 1 ml of water

Level 7: Regular, Easy to Chew
- = Foods that are “soft” but no particle size restriction
- It’s a subcategory of Level 7
- Intended for individuals who do NOT have swallowing difficulties
- but require softer foods for other reasons (choice, recent illness, temporary mouth or jaw pain).

Positive things about IDDSI...
- Establishing the level of thickness of liquids
- Is more objective
- Help achieve better agreement among staff, clinicians, patients, families...
  - All potentially enhancing patient safety

Person-Centered Care
"Half-nectar" (not standardized; use IDDSI methods and terminology)

- Challenges with testing fluids thickened with rice cereal/flow test addressed at IDDSI Town Hall, ASHA 2019
  - Suggestion run through blender first
  - Gosa/Dodrill: "rice cereal not a thickener; clogs nipples"
  - Have designed a flow test funnel

Pediatric Journal Discussion October 2020

Question posed during discussion?
- Has the development of IDDSI improved instrumental evaluation of swallowing physiology in this population in regard to barium mixtures?
- Response: There's been very little work on the rheological properties of human milk to compare to barium mixtures. This work is ongoing. - Catherine Shaker

"Transitional foods"

- Foods that start as one texture and change to another with moisture or temperature
- E.g. Potato crisps (e.g. Pringles), waffle cones, ice, ice cream, Cheeto Puffs, Baby Mum Mums, Gerber Graduate Puffs

Evidence

- Downfalls of "pre-IDDSI" (non-instrumental) methods
  - Inherent issues related to achieving consistent thickness levels when individuals mix their own drinks using thickening products (Steele, 2003; Glassburn & Deem, 1998)
  - A study found thickened fluids prepared in the hospital by clinicians were significantly different from those prepared in the laboratory, yet both used the same instructions (Payne et al, 2011).
  - Also, little is known regarding the equivalency of products between different manufactured products

- Logical rationale behind some IDDSI specifications
  - Information related to minimizing choking hazards for adult and pediatrics has been gathered from research about autopsy results and asphyxiation studies (Samuels & Chadwick, 2006)


Varibar: There is no “slightly thick” (1)

- Anecdotally, many aspects about IDDSI appear favorable
  - Consistent, “easy to understand and implement” method of testing liquid thickness gives families confidence, achieves better consistency
  - IDDSI and the evidence surrounding its use is in its infancy!
"According to our review, no studies have yet shown that the proposed terminology and levels
improve the treatment of dysphagia, acceptability, quality of life, nutritional status, hydration, or aspiration pneumonia
no publication has investigated the validity of IDDSI methods for measuring food texture"

No studies demonstrating improved inter-rater and intra-rater reliability with these methods vs. others...

Thickeners for thickening by hand
1. Dry, granular thickeners (e.g. Walgreen)
   - May result in lumps
   - Instability over time
   - Ben, O'Leary and Smith “The effect of saliva on the viscosity of thickened drinks,” Dysphagia 27.1 (2012): Contamination of just 1 ml of saliva to 200 ml of thickened (corn starch thickener) water decreased the viscosity almost back to plain water
   - Lack repeatability (e.g. depending on the beverage mixed with)
   - Lack of inter-rater reliability between trained individuals

2. Xanthan gum thickeners (e.g. Simply Thick-gel thickener)
   - More stable across base liquid types and over time
   - Recall: Simply Thick is NOT intended for use with preterm or infants under 12 months of age or children under the age of 12 years with a history of NEC.
   - Safe for celiacs

3. Organic carob bean gum (Gelmix)
   - free of soy, corn, wheat, gluten, casein, whey & lactose. For additional information Gelmix Formula & Breast Milk Thickener - Nature's Healthier Thickening Option
   - More expensive than canned or gel thickeners and mixing by hand
   - Many agree they taste better
   - Get a more consistent and stable product
   - Quicker than hand-mixing

Newer options: Pre-thickened liquids
- "There are MANY brands
Thickened Liquids: evidence

- **Liquid aspiration: most common type of aspiration in older populations**, primarily those with debilitation, dementia and depression (Freihberg, Knobbe, Tolley, & Segal, 1990).
- "**Thickened liquids are used all over the world**" (Cicero, DRS 2015).
- "Thickened liquids are frequently part of dysphagia management" (Carnaby & Hansenberg, 2012; Garcia, Chambers, & Molander, 2009).
- Many nursing home personnel routinely place patients with dysphagia on thickened liquids. (Robbins, "Protocol 201", Perspectives on Swallowing and Swallowing Disorders (Dysphagia) July 2000 vol. 9 no. 2 2-5).

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**Concerns: Simply Thick/Thickeners**

- Re: September 18, 2012 News Release (FDA) *This warning is specific to SimplyThick and does not include other thickening products* "Parents and caregivers who have questions or concerns related to the use of the product and/or who have medical concerns should contact their health care provider."
- FDA spokeswoman Tamara N. Ward *"SimplyThick and other thickeners are not meant for infants, period. Infants are not meant to be eating solid foods, so these products are not appropriate."*
- Such products do have a role in older kids and adults with swallowing disorders. He also says he would not use these products to treat infant reflux.
  - Jesse Reeves-Garcia, MD. He is the director of gastroenterology at Miami Children’s Hospital
- *Listserv post by Amy Lustig*

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**What interventions are most helpful for Preterm infants?**

- "Over the last 27 years in the NICU, I have found *sidelying, along with slow/low flowrate and co-regulated external pacing*, to be one of the *most critical interventions* to support positive and safe feeding experiences with preterms."
- Catherine S. Shaker, MS/CCC-SLP, BCS-S Board Recognized Specialist - Swallowing and Swallowing Disorders Florida Hospital for Children Orlando, FL www.shaker/swallowingandfeeding.com

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**So what are pediatric therapists doing?**

- **Infant cereal**
  - most common: rice and infant oatmeal
  - ineffective with breast milk (due to amylases) (Duncan et al., 2019)
  - "...some have concern for grain allergy, increased constipation, other concerns (altering of caloric density and nutrients, electrolyte balance, free water etc.) - Catherine S. Shaker, MS/CCC-SLP, BCS-S
- **Fruit purées**
- **Commercial Thickeners** (e.g. some report using Gelmix)
  - None approved for preterm infants
  - Concerns about impact on pediatric microbiome; thickeners thickening over time, or clumping (Duncan et al., 2019)
  - Risks of thickeners (Duncan et al., 2019)
  - Arsenic
  - Necrotizing Enterocolitis (Simply Thick and Carobel)
  - Simply Thick instructions: for children over 12 years, though some facilities "any using it in low-risk children as young as 12 months with close follow-up" - Catherine S. Shaker, MS/CCC-SLP, BCS-S
- **Dehydration**
  - Though studies show there is no difference in water absorption for patients with thickened liquids, Sharp et al., (2007) and Krummrich (2017) also found increased, not decreased, liquid intake with thickening
  - Changes in Bowel Movements
This article addresses the topic of thickeners for children under 2 years.

- Reflux
  - Refluxate in infants and young children unlike adults, is primarily non-acid
  - Acid suppressing medications, therefore, are ineffective and produce some adverse effects, such as GI or respiratory infections
  - It is theorized that thickening for GERD reduces the amount of refluxate into the esophagus and even into the oropharynx
- Duncan et al’s conclusions:
  - "Thickening is first-line therapy before acid suppression. From an oropharyngeal dysphagia perspective, the alternative to thickening would involve continued aspiration with increased pulmonary morbidity, hospitalizations and ER visits in addition to increased placement of enteral tubes"

Case Study 1: To Thicken or Not To Thicken

- Baby Boy Smith is a former 28 week preemie who is now is 4 months old (16 weeks old) corrected age is 44 weeks.
- He is getting ready to discharge from the NICU. During his NICU stay he was intubated for 2 weeks and was also on a NEC watch.
- He continues to work on oral feeding and receives a combination of NG-tube and bottle feedings. He is receiving expressed breast milk fortified to 24 calories/oz.
- His nurse reports his goal intake is 65 cc per feeding on a Q3 schedule. He often spells during feeding and oral intake averages 30-40 cc's via the Dr. Brown Preemie nipple in semi-upright position. Nursing also reports anterior liquid loss.
- Given he is 44 weeks and continues to spell during feeds, he was sent for a modified barium swallow study.

Results of the MBS/VFSS revealed:
- Thin liquid via Dr. Brown Preemie nipple in semi-upright: Silent aspiration during the swallow
- Thin liquid via Dr. Brown Preemie nipple in side-lying: Laryngeal penetration that was slow to clear and often deep at times
- Slightly thick - IDDSI (1/2 nectar thick) liquid via Dr. Brown Preemie nipple in side-lying: no evidence of laryngeal penetration or aspiration
- Thin liquid via Dr. Brown Ultra Preemie nipple in side-lying: Initially no evidence of laryngeal penetration or aspiration, during resting for “change over time” there were 2 episodes of shallow laryngeal penetration
Pediatric Dysphagia Webinar: take-aways
11/17/20

• Theme from entire webinar:
  • lots of variability in practice with pediatrics (like adults)
  • Variable practices with nasogastric vs. G-Tubes at discharge
    • “We don’t discharge our peds with an NG”
    • We have a lot of discharges with an NG (non-profit outpatient)”
  • Variation in swallowing evaluation report content/terminology

“Normal”/healthy/typical findings

Penetration vs. Aspiration

Hello,

I have a patient who is 93 s/p cardiorespiratory arrest. He has no history of CVA or any other neurological disorder. He has no history of pneumonia. On his mbss, pt demonstrated transient penetration with thin liquids only. He was placed on nectar thick liquids as a precaution from acute care. Would any of you recommend vitalstim based on this information? Also, at what point is this considered within functional limits given his age? Thank you.

-------------------------------------------
Y.M

• Thick liquids seems like overtreatment for a non-impairment and there is no rationale for it (or for electrical stimulation) but we do not know the rest of the history or findings. Transient laryngeal penetration is somewhat common in people over 50 and occurs in up to 20% of those in the “young” category (20’s) (references below - the Robbins et al. was strictly thin liquid so it applies to your case). Was it deep or shallow transient laryngeal penetration, how often, under what conditions with thin liquid?


James L. Coyle, Ph.D., CCC-SLP; BCS-S
Associate Professor, Communication Science and Disorders University of Pittsburgh
"Normal"/Healthy Findings in Adults: Penetration and Aspiration

- Steele et al., 2019
  - penetration is unusual but may occur (some individuals may demonstrate penetration above the folds that is "ejected", i.e. PAS 1-2) (even less likely to be > 2 with thicker liquids)
  - Daggett, 2006
  - Airway penetration increased after age 50 (in normals)

10% of the 98 subjects penetrated

52% of the 98 subjects penetrated

"all penetrations were rated as a 2 on the PA scale."

- Robbins et al. 1999
  - Most (97%) performed by the normal subjects received low scores (1 or 2) on the Penetration-Aspiration scale. No material entered the airway on the first of several sequential swallows performed by the majority (79%) of healthy subjects (score of 1).

So take homes...

- Penetration may occur in "normal" swallowing
  - If not "ejected" - abnormal (Steele), i.e. "normal" PAS scores 1-2 (Robbins)
- Airway penetration increases after age 50
- Aspiration is abnormal and was not seen in healthy subjects (Steele); no subjects with penetration aspirated (Daggett 2006)

Final revision of the 8-Point Penetration-Aspiration Scale

1. Material does not enter the airway
2. Material enters the airway, remains above the vocal folds and is ejected from the airway
3. Material enters the airway, remains above the vocal folds, and is not ejected from the airway
4. Material enters the airway, contacts the vocal folds, and is ejected from the airway
5. Material enters the airway, contacts the vocal folds, and is not ejected from the airway
6. Material enters the airway, passes below the vocal folds and is ejected into the larynx or out of the airway
7. Material enters the airway, passes below the vocal folds, and is not ejected from the trachea despite effort!
8. Material enters the airway, passes below the vocal folds, and no effort is made to eject

Rosenbek, Robbins, Beerbra, Coyle and Vaneker, 1999

After the swallow:

What’s “Normal”/Healthy Findings in Adults: Pharyngeal residue webinar

- Catriona Steele, Director of Swallowing Rehabilitation Research Laboratory, KITE Research Institute, Professor, University of Toronto
- January 2, 2021

Pharyngeal Residue Webinar
What is pharyngeal residue?

- Bolus material left behind in the pharynx AFTER the swallow
- Two common places valleculae and pyriform sinuses

2. Is it ever normal to have residue?

"And the answer as far we know from research, is no.

3. Is residue worse with specific liquids?

"Healthy people generally swallow a bolus in a single swallow with no residue left behind"

- Only small increases in residue with thicker liquids
- Using a teaspoon to serve the thickest liquids, reduced residue
- Gum thickeners less likely to leave residue than starch-based
Is this normal?

- Feeding specialists **must be aware of normal developmental milestones** to identify potential treatment targets.

Summary: Normal anatomy and physiology

- The larynx is seated higher in the neck and more anteriorly in infants (Memorie Gosa “Infant Airway Protection Mechanisms During Swallowing” (Perspectives)
  - **So less/minimal laryngeal elevation** occurs during swallowing*
  - “the epiglottis is not displaced, as it is with maturation, growth and development, as a biomechanical effect of hyolaryngeal excursion.” (Listserv post, Catherine S. Shaker, MS/CCC-SLP, BRS-S)

Summary: normal anatomy and physiology

- Laryngeal penetration is a common finding in pediatrics, with increased occurrence in preemies and infants/children with chronic medical conditions.
  - in children under 2 years of age, penetration may be indicative of aspiration risk.
  - "any finding of LP (laryngeal penetration) in a symptomatic child should be considered clinically significant and a change in management should be considered” (Duncan et al. (2019, *Journal of pediatric gastroenterology and nutrition*)

Suck-swallow-breath ratio

- A mature suck-swallow-breath cycle has a 1:1:1 ratio meaning one effective suck will bring an appropriately sized bolus, only one swallow is needed to clear that bolus entirely from the pharynx and these stages are followed by one adequate inhalation breath’
  - A typical full-term infant can engage in 12-20 SSB cycles before pausing for a larger, calmer breath. (*Pediatric Feeding Disorders: Evaluation and Treatment* Van Dahm text, p. 101)
  - “The need to initiate a timely breath after each swallow and indeed a regular series of deep breaths has been supported in recent BSC (Breath-Swallow-Coordination) literature”. (Listserv post, Catherine S. Shaker, MS/CCC-SLP, BRS-S)

Swallowing-respiration coordination

- For most full-term infants (and adults), swallows primarily occur when NOT inhaling  
  (e.g., during exhalation, end of inspiration or exhalation, or during pauses)
  - preterm infants though primarily swallow during "deglutition apnea" or inhalation, (increasing risk of penetration or aspiration or oxygen desaturation). (Lau, “Development of infant oral feeding skills: what do we know?” 2016)
  - preterm infants have been shown be at high risk to inhale after the swallow, due to depletion of their respiratory reserves likely due to the tendency to suck without sufficient and timely pauses to breathe. Co-regulated pacing is essential (Listserv post, Catherine S. Shaker)

Tools: evidence

- Penetration-Aspiration Scale
  - Demonstrated acceptable inter and intra-rater reliability in pediatric populations (Gosa & Suiter, 2011, ASHA)
  - BaByVFSSimP (Martin-Harris, Dysphagia 2020)
    - First standardized assessment tool developed to quantify swallowing observations from VFSS studies in bottle-fed babies
    - Recently the construct validity was investigated
    - Holds promise for identifying physiologically based intervention targets

Questions and Answers

**9:50-10:00**