Myths part 2

Aspiration Pneumonia is Well Understood

Aspiration Always Leads to Pneumonia

- Aspiration Pneumonia Research
  - VF and FEES did not significantly predict aspiration pneumonia. Specifically, "Documented aspiration of food or liquid on an instrumental swallow study were not predictors of pneumonia." 'Only' 38% of those who aspirated developed pneumonia.
  - Therefore, dysphagia by itself does not appear to cause aspiration pneumonia. "Dysphagia and aspiration are necessary but not sufficient conditions for development of pneumonia."

Langmore 1998

Aspiration Always Leads to Pneumonia

Study of 515 patients with dementia and/or Parkinson's Disease

- 11% (52) of patients developed pneumonia in 3 months
  - 9.8% using compensatory chin tuck (chin down)
  - 8.4% with nectar thick liquids
  - 15.0% with honey thick liquids

Robbins 2008

PRANDIAL ASPIRATION AND PNEUMONIA IN AN ELDERLY POPULATION FOLLOWED OVER 3 YEARS FEINBERG 1996

- Study followed 152 patients for 3 years
  - 50 non aspirators,
  - 51 minor aspirators,
  - 51 major aspirators
    - 21 PEGS
    - 6 NGT

Our results indicate that there is not a simple and obvious relation between prandial liquid aspiration and pneumonia. Artificial feeding does not seem to be a satisfactory solution for preventing pneumonia in elderly aspirators.

PRANDIAL ASPIRATION AND PNEUMONIA IN AN ELDERLY POPULATION FOLLOWED OVER 3 YEARS FEINBERG 1996

Status	Months	Pneumonia Episodes	Frequency
No Aspiration	1173	7	0.6%
Minor Aspiration	1493	13	0.9%
Major Aspiration/Oral feeding	1116	14	1.3%
Major Aspiration/Artificial Feeding	498	22	4.4%
Total	4280	56	1.3%

PRANDIAL ASPIRATION AND PNEUMONIA IN AN ELDERLY POPULATION FOLLOWED OVER 3 YEARS FEINBERG 1996

Mortality Rates

Final Status	Deaths	PNA in pts who expired	PNA considered cause of death
Non aspirators	7 (19%)	5 (71%)	2 (43%) (NS)
Minor aspirators	9 (24%)	7 (78%)	3 (33%) (NS)
Major aspirators Oral feeding	21 (45%)	10 (48%)	7 (33%) (NS)
Major aspirators Artificial feeding	26 (87%)	15 (58%)	14 (54%)
Total	63 (41%)	37 (59%)	27 (43%)

PRANDIAL ASPIRATION AND PNEUMONIA IN AN ELDERLY POPULATION FOLLOWED OVER 3 YEARS FEINBERG1996

Conclusion:

- Results indicate that there is not a simple and obvious relation between aspiration and pneumonia.
- Artificial feeding does not seem to be a satisfactory solution for preventing pneumonia in elderly aspirators.

THE NATURAL HISTORY OF PATIENTS WHO ASPIRATE
BOCK 2018

- Dysphagia etiology was highly associated with increased development of pulmonary events for some patients, especially those with generalized nonspecific dysphagia due to deconditioning or frailty and esophageal dysphagia.
- Dietary modification recommendations at the time of VFSS (prohibition of oral intake or modification of food consistency) had no significant impact on time to first pulmonary event or survival
- Severity of aspiration as defined by PAS was not associated with altered overall survival

THE NATURAL HISTORY OF PATIENTS WHO ASPIRATE BOCK 2018

- "Recommendations for dietary modification to a nothing by mouth status or modified food consistency had no statistically significant association with development of pulmonary events or survival in patients with detectable or unsensed penetration or aspiration on VFSS compared to full-diet recommendation."

ASPIRATION AS A FUNCTION OF AGE, SEX, LIQUID TYPE, BOLUS VOLUME, AND BOLUS DELIVERY ACROSS THE HEALTHY ADULT LIFE SPAN BUTLER 2018

- 203 healthy adults across the life span produced 6404 test swallows.
- 50% of the participants penetrated on 1 or more swallows
- 18% of the participants aspirated on 1 or more swallows
- Adults in the 8th and 9th decades demonstrated a greater difference in PAS scores with increasing liquid viscosity
- Females demonstrated consistent PAS scores across liquid volumes
- Males' PAS scores increased with the 15 to 20 ml volumes
- The likelihood of aspiration and penetration increased significantly with increasing liquid fat content as well as age
- Increased volume also increased aspiration odds

…BUT The Patient Has A Diagnosis of Aspiration Pneumonia

Aspiration Pneumonia: A Review of Modern Trends DiBardino, 2015

- A host of literature, mostly in the elderly, stroke victims, and nursing home population, associates documented dysphagia and presence of dysphagia risk factors with pneumonia. The patient population itself confounds analysis, as a number of studies associate age itself to aspiration pneumonia .
- These data are generated from patients diagnosed with pneumonia with no discrimination between aspiration pneumonitis, as we have defined it, and traditional community acquired pneumonia (CAP).

Aspiration Pneumonia: A Review of Modern Trends DiBardino, 2015

- "Dysphagia literature examining pneumonia risk factors classifies all pneumonia with the term 'aspiration pneumonia' and combines all patients with pneumonia to generate end points."
- "Aspiration pneumonia represents 5% to 15% of pneumonias in the hospitalized population."
- "The ICD-9 code–based reviews suggest an increasing incidence, making it the second most common diagnosis in Medicare patients who are hospitalized [2,44]. However, higher reimbursement rates for this ICD-9 code than for CAP ICD-9 codes may falsely increase the frequency in this population."

Aspiration: /aspə'rāSH(ə)n/: Noun: An Ambiguous Term Used for a Diagnosis of Uncertainty Ferguson 2018

- "The commonly used term, 'aspiration pneumonia,' is misleading to clinicians and should be abandoned"
- "This terminology may be considered lazy or dangerous and are often used when the diagnosis is uncertain, leading to a false sense of security by clinicians."
- "Often in the face of clinical uncertainty, the term aspiration event is utilized."
- "There is no uniform definition for the term aspiration pneumonia, no gold standard test to diagnose aspiration"

Aspiration: /aspə'rāSH(ə)n/: Noun: An Ambiguous Term Used for a Diagnosis of Uncertainty Ferguson 2018

- The nasopharynx, oropharynx, lung, and esophagus share the same microbiome because of chronic microaspiration that occurs naturally, which varies by diet, age, and geographic location

Aspiration: /aspə'rāSH(ə)n/: Noun: An Ambiguous Term Used for a Diagnosis of Uncertainty Ferguson 2018

- "An attempt to delineate whether it is a 'regular pneumonia' or an aspiration pneumonia on the basis of a speech therapy evaluation is needless and inaccurate as dysphagia and chronic silent aspiration are often not witnessed, and unlikely to reduce recurrent pneumonia.
- A patient with a history of head and neck cancer, previous stroke, or neurological disorder is commonly reflexively diagnosed with aspiration pneumonia despite a lack of findings of dysphagia."
- "Good oral care for all patients, however, especially after stoke, may prevent recurrent pneumonia episodes as poor dentition, care, and changes in salivary flow are more likely to lead to [bacterial]colonization"

Pillars of Aspiration Pneumonia

Ashford 2016

Myth: SLPs understand how to prescribe diets

WHAT INFORMATION DO CLINICIANS USE IN RECOMENDING ORAL VERSES NONORAL FEEDING IN OPROPHARYNGEAL DYSPHAGIC PATIENTS LOGEMANN 2008

- "There is little evidence regarding types(s) of information clinicians use to make the recommendation for oral or non-oral feeding in patients with oropharyngeal dysphagia."
- Part 1: Several small groups of clinicians were surveyed to obtain the variables used to make oral verses non oral recommendation
- 46 variables were identified
- The list of 46 variables was given to clinicians to rank the top 10 variables that were important
- 13 variables were identified

WHAT INFORMATION DO CLINICIANS USE IN RECOMENDING ORAL VERSES NONORAL FEEDING IN OPROPHARYNGEAL DYSPHAGIC PATIENTS LOGEMANN 2008

- Part 2: 20 MBSS videos were sent to 23 clinicians
- Decisions:
  - Oral
  - Partially oral with nonoral feeding
  - Nonoral
- Include which of the 13 variables influenced their decision

Frequency Rank	Criterion	Frequency %	Kappa
1	Amt of aspiration	79.6%	0.0008
2	Frequency of aspiration	70.4%	0.059
3	Diagnosis	44.6%	0.011
4	History of pneumonia	40.4%	0.243
5	Ability to complete postures	35.4%	0.228
6	Cough ability	35%	0.137
7	Severity of medical condition	32.0%	0.153
8	Recovery prognosis	26.7%	0.063
9	Respiratory status	22.6%	0.076
10	Silent aspiration	22.4%	0.222
11	Patient wishes	21.5%	0.056
12	Alertness	21.3%	0.038
13	Secretion management	11.7%	-0.001

The Influence Of Food Texture And Liquid Consistency Modification On Swallowing Physiology And Function

Steele 2015

- This systematic review identified major gaps in the understanding of the impact of liquid consistency and food texture on swallowing physiology, both in healthy and disordered populations.
- With respect to objective measures that might be used to guide the classification of thickened liquids and texture modified foods, the review identified an absence of convention, particularly in terms of the shear rates that are used for reporting apparent viscosity.
- Exceptionally limited information is available for objective measurement of texture-modified foods.

Changing Diet Texture

- Study evaluated dietary intake over the course of a day in hospitalized patients older than 60 years comparing intake in patients consuming a regular diet to those consuming a texture modified diet
- Patients on the modified diet had a significantly lower nutritional intake in terms of energy and protein.
- 54% of patients on a texture modified diet were recommended a nutritional supplement, compared with 24% of patients on a regular diet.

Wright 2005

Changing Diet Texture

Compared with the normal diet the puréed and liquid diets were the ones with the most reduced:

- energy (31.4% and 39.9%, respectively),
- protein (45.4% and 79.8%, respectively)
- lipid (41.0% and 76.0%, respectively) contents.

Viganó 2011

Thickened Liquids

- Despite the lack of evidence to support first-line use of thickened liquids, many clinicians continue to believe they are an effective intervention. (Wang 2016)
- In a 2005 survey of speech-language pathologists, respondents prescribed thickened liquids to 25% to 75% of patients with dysphagia. (Garcia 2005)

Thickened Liquids

The Influence of Food Texture and Liquid Consistency Modification on Swallowing Physiology and Function: A Systematic Review (Steele 2015)

"Qualitative synthesis revealed two key trends with respect to the impact of thickening liquids on swallowing: Thicker liquids reduce the risk of penetration–aspiration, but also increase the risk of post-swallow residue in the pharynx."

Thickened Liquids

- "No strong evidence is available supporting the use of thickened liquids as an intervention for patients with dysphagia." Sura et al. 2012
- Dehydration occurred to a significant degree in the presence of thickened liquids. Logemann 2003
- Dehydration in the elderly can lead to:
  - Hypotension
  - Falls
  - Constipation
  - UTI
  - Confusion
  - Delirium
  - Poor recovery from illness

Thickened Liquids

Complications that may arise from thickeners:

- Slow gastric emptying
- Increase risk of reflux
- Reduce appetite

Thickening agents used for dysphagia management: effect on bioavailability of water, medication and feelings of satiety Cichero 2013

- Dehydration may be due to physiological expectations that thick fluids will make them feel full
- Flavor suppression associated with increasing thickness provides little motivation to drink.
- The mucoadhesive qualities of thickeners leave the mouth feeling sticky after a drink rather than wet, resulting in continuing unresolved feelings of thirst
- Administration of medication with thickened liquids needs careful consideration and consultation with a pharmacist as effects of delayed dissolution and disintegration have been demonstrated

Thickening Agents Used For Dysphagia Management: Effect On Bioavailability Of Water, Medication And Feelings Of Satiety Cichero 2013

- This literature review suggests that individuals prescribed very thick liquids (e.g. pudding-thick) will struggle to meet hydration needs orally. Individuals receiving moderately thick (e.g. honey-thick or 'nectar thick') will also perceive their drinks to be more filling and will consume less than those on unthickened beverages.

Use of Thickened Liquids in Skilled Nursing Facilities Castellanos 2004

- A mean of 8.3% (range 0% to 28%) of residents were receiving thickened liquids, with considerable variation regions. Of those receiving thickened liquids, on average 60% received "nectar/syrup" thick, 33% received "honey" thick, and 6% received "pudding/spoon" thick.

Defining Physical Properties Of Fluids For Dysphagia Evaluation And Treatment Robbins 2002

"The generally accepted clinical notion that manipulation of thicker (more viscous) substances reduces occurrence of aspiration, or modifies other bolus flow characteristics in dysphagic persons that produce an "improved swallow," has little support, other than anecdotal, in the literature. Despite the paucity of data, the manipulation of thickness in the diet has become a cornerstone of dysphagia management practice."

HOW THICK IS THICK? MULTICENTER STUDY OF THE RHEOLOGICAL AND MATERIAL PROPERTY CHARACTERISTICS OF MEALTIME FLUIDS AND VIDEOFLUOROSCOPY FLUIDS CICHERO 2000

"There is poor correlation between the viscosity of thickened liquids used during videofluoroscopic tests and the viscosity of liquids prepared to the same target levels for patients during mealtime."

The Horrible Taste Of Nectar And Honey Inappropriate Use Of Thickened Liquids In Dementia Wang 2016

"Use of thickened liquids reduces videofluoroscopic

evidence of aspiration in older adults with dementia but does not reduce the 3-month risk of pneumonia in the same population."

Malnutrition

- 15% of community-dwelling and home-bound elderly,
- 23% to 62% of hospitalized patients and
- up to 85% of nursing home residents suffer from malnutrition.

Ahmed 2010

Malnutrition

- The prevalence of malnutrition increases in the geriatric population and is associated with a decline in:
  - functional status
  - impaired muscle function
  - decreased bone mass
  - immune dysfunction
  - anemia

Ahmed 2010

Malnutrition

Effects of Malnutrition:

- reduced cognitive function
- poor wound healing
- delayed recovery from surgery
- higher hospital readmission rates
- mortality

Ahmed 2010

Malnutrition

Effects of malnutrition

- Respiratory problems
- Cardiac problems
- Infections
- DVT
- Multi-organ failure

Brownie 2005

Malnutrition

Brownie 2005 states:

Malnutrition “exacerbates existing medical conditions, increases risk of complications, leads to a decline in functional status and is associated with increased demands on medical services, lengthier hospital stays, readmission, early institutionalization and decreased survival time.”

Malnutrition

- Aging is associated with decreased intracellular fluid and lean body mass. This correlates with altered physiological responses:
  - Reduced cellular capacity to store water
  - A decline in strength, balance and muscle mass
  - Increased truncal obesity
- These changes predispose older people to dehydration, reduced basal metabolism, falls, injury, and central weight gain
- Noticeable changes in body composition often go unnoticed because the proportion of fat generally increases causing the total **body weight to remain relativity stable**.

Brownie 2005

Malnutrition

- "Modifying the consistency of solid food and/or liquid is a mainstay of compensatory intervention for patients with dysphagia." (Sura 2012)
- A recent survey (n=357) indicated :
  - 53% of SLPs report they have no training in nutrition
  - 77% of SLPs consult a dietitian 50% or less of the time when recommending a diet change
  - 20% of SLPs report 0 consultations with a dietitian when changing a diet in the past 12 months

Bice 2018

Malnutrition

- "The nutritional consequence of a reduced lean body mass results in a reduced metabolic rate, and a proportional decline in total energy (caloric) requirements." This has serious implications for the diet, specifically in the adequacy of protein and micronutrient intake. "In light of a reduced energy requirement, the quality of food selected by older people becomes vitally important, and food choices are a crucial determinant of optimal health."
- High-quality, nutrient dense foods are needed to preserve muscle mass.

Brownie 2005

Malnutrition

- Diet software analysis in a particular study revealed modified diets contain fewer calories than regular diets (analyzed for a 5 week menu cycle).
  - On average pureed trays provided 1700 kcal/day
  - Regular texture provided 2100 kcal/day
- Another study directly analyzed food from 3 consecutive days in ten facilities.
  - Average energy provided per day:
    - Regular diet 2413 with 13% protein
    - Chopped 2055 with 12% protein
    - Pureed 2174 with 11% protein

Keller 2012

Malnutrition

- A different study used weighted food records. Those on an altered diet consumed a significantly lower amount of energy (923 verses 1456 kcal) and protein (40 verses 60 g).
- A study using a plate waste method with 215 residents from several facilities found those who consumed an altered diet consumed significantly less energy, protein, calcium and vitamin D.

Keller 2012

Malnutrition

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Viganó 2011

Malnutrition

- Patients who consumed an altered diet had decreased skeletal muscle mass
- Decrease FIM scores were independently related to texture modified diets
- Over half the patients on altered diets were malnourished
- Energy and protein intake were significantly lower

Shimizu 2017

Malnutrition

- "Traditional dietary intervention methods intended to improve the nutritional status of long-term care residents without dysphagia are not necessarily evidenced-based."

Dunne 2007

Malnutrition

Standardized markers or characteristics to diagnosis malnutrition include identification of two of six characteristics:

- insufficient energy intake
- weight loss
- loss of muscle mass
  - bioelectric impedance (BIA)
  - dual energy X-ray absorptiometry (DXA),
  - computed tomography (CT)
  - magnetic resonance imaging (MRI)

Kline 2014

Malnutrition

- loss of subcutaneous fat
- localized or generalized fluid accumulation that may sometimes mask weight loss
- diminished functional status as measured by hand grip strength

Kline 2014

Dysphagia and Dietary Levels in Skilled Nursing Facilities Groher 1995

- 212 nursing home residents on mechanically altered diets
- Swallowing evaluation including:
  - Medical history
  - Physical examination
  - FEES
  - MBSS
  - Detailed observation of 2 meals
  - Sustained attention
  - Posture
  - Self feeding skills

Dysphagia and Dietary Levels in Skilled Nursing Facilities GROHER 1995

- Appropriate diet levels were determined by:
- Integrity of physical examination
  - Xerostomia
  - Deglutitory muscle strength
  - Secretion and food management
  - Cognitive status
  - Ability to feed self
  - History of aspiration pneumonia
  - General health status
  - Overall abilities during mealtime
- Diet level was not considered to be changed unless the resident tolerated for 30 days without >2% weight loss and no pneumonia

Dysphagia and Dietary Levels In Skilled Nursing Facilities Groher 1995

- 91% were able to eat diets above the prescribed diet level
- 4% were consuming diets above an appropriate level
- **5% were considered to be at the appropriate diet level**

Feed Tubes Are “Safe”

Feeding Tubes Make Patients "Safe"

- No published randomized trials that compare tube feeding with oral feeding.
- There is no data to suggest that tube feeding improves any of these clinically important outcomes and some data suggests it does not:
  - Reduce risk of aspiration pneumonia
  - Prolong survival
  - Reduce the risk of pressure sores
  - Reduce risk of infections
  - Improve function
  - Provide palliation

Finucane 1999

Feeding Tubes Make Patients "Safe"

- Over the last 2 decades, research has failed to demonstrate benefits of tube feeding in patients with advanced dementia.

- Expert opinion and position statements by national organizations increasingly advocate against this practice.

Mitchell 2016

Feeding Tubes Make Patients "Safe"

Aspiration pneumonia is among the most serious complication of gastrostomy tube feedings. However, few data are available from the nursing home setting where tube feedings are used for extended periods.

- Reviewed 109 nursing facility charts in order to determine the incidence of, and risk factors for, aspiration pneumonia:
  - 22.9% of gastrostomy tube-fed patients aspirated.
  - A history of recent previous pneumonia was found in 40.7% of those who subsequently developed aspiration pneumonia.

Cogen 1989

Aspiration = Risk

Risk can be measured/we can make our patients safe

- List of valid tools that measure patient "risk" of aspiration:

"The risk of aspiration is an emotional response of the clinician not a pathophysiology in the patient."

-Dr. Michael Crary

Possible “risk”?

- **“Predictors”**
  - Dependent for feeding
  - Number of decayed teeth
  - Multiple medical diagnoses
  - Current smoker
  - Number of medications
  - Dependent for oral care
  - Tube fed

Langmore 1998

Risk can be measured/we can make our patients safe

Healthy normals aspirate so…

What is a safe swallow?

Maintain nutrition?

Maintain hydration?

No pneumonia?

No coughing/choking?

Patient feels they have good quality of life?

Imaging Assessments Result in “Objective” Information

Subjective Assessment of Videofluoroscopic Swallow Studies

LEE 2017

- Seventy-six VFSS videos of patients with dysphagia were presented to blinded, experienced speech-language pathologists and laryngologists
- Evaluators rated each video as normal or abnormal for
  - hyoid elevation
  - pharyngeal area
  - pharyngeal area constriction (PCR)
  - Pharyngoesophageal segment opening
- A blinded investigator assessed evaluators' inter- and intrarater agreement and compared their responses to objectively measured results for these parameters to examine accuracy.

Subjective Assessment of Videofluoroscopic Swallow Studies

LEE 2017

- Evaluators correctly classified only 61.5% of VFSS videos as "normal" or "abnormal"
- Agreement was highly variable
- Accuracy:
  - PCR at 71.6%
  - Hyo-laryngeal elevation was 61.3%
  - PES opening was 59.2%
  - Pharyngeal area was 45.3%
- Evaluators unanimously agreed on a "correct" interpretation of a VFSS only 28% of the time

Subjective Assessment of Videofluoroscopic Swallow Studies

LEE 2017

- "Subjective assessment of VFSS parameters is inconsistently accurate when compared with objective measurements, with accuracy ratings ranging from 45.3% to 71.6% for specific parameters"

Interjudge Agreement in Videofluoroscopic Studies of Swallowing

Wilcox1996

- 10 therapists were given 3 recorded studies along with patient history and the results of the clinical swallow evaluation
- Clinicians spent 30 to 60 minutes reviewing the tape
  - More time than usual
  - Typically did not view tapes out of the radiology suite
  - Clinicians reported they typically were only concerned with the presence or absence of aspiration
- Poor agreement across all areas

ELUCIDATING INCONSISTENCIES IN DYSPHAGIA DIAGNOSTICS: REDEFINING NORMAL PLOWMAN 2018

Clip	Rated normal swallow within normal limits	Rated normal swallow as disordered
1	94.0	6.0
2	46.0	54.0
3	69.4	30.6
4	58.3	41.7
5	62.2	37.8
Average	66.0	34.0

Survey of Clinician Decision Making When Identifying Swallowing and Determining Treatment

Vose 2018

- 3 Swallows
  - Easy: swallow delay
  - Moderate: swallow delay, duration of LVC, duration and amount of UES opening
  - Complex: LVC reaction time, duration of LVC, amount and duration of UES opening

“Easy Swallow”

- 88% identified the issue
- 77% identified 5-9 issues
- 27% identified 10+ issues

“Moderate” Swallow

- identified all four issues
- 59% amount of UES opening
- 49% duration of UES opening
- 46% delayed swallow initiation
- 39% duration of LVC

“Complex” Swallow

- 0% identified all 4 impairments
- 68% amount of UES opening
- 65% LVC reaction time
- 54% duration of UES opening
- 53% duration of LVC

Observer' Agreement of Measurements in FEES Pilz 2015

- Two evaluators scored 60 FEES
- Prior to data collection raters completed an "intensive" training program on the rating scales of four visuoperceptual ordinal variables
  - Piecemeal deglutition
  - Post-swallow vallecular pooling
  - Post-swallow pyriform sinus pooling
  - Laryngeal penetration/aspiration

Observers' Agreement on Measurements in FEES
Pilz 2016

- Intra- and inter-rater agreement on FEES measurements ranged from 0.76 to 0.93 (rater 1)and from 0.61 to 0.88 (rater 2)
- Bolus consistency resulted in decreased inter-rater agreement for all measured FEES variables during thin liquid swallows
- When rating on consensus, the raters deviated considerably from the scores they had previously given on the independent rating task

Dysphagia Therapy is Practiced as a Precise Science

WHAT IS ‘‘USUAL CARE’’ IN DYSPHAGIA REHABILITATION: A SURVEY OF USA DYSPHAGIA PRACTICE PATTERNS CARNABY 2013

- The scope of dysphagia rehabilitation methods has been changing.
- Research has moved away from the use of behavioral compensations and maneuvers toward a greater emphasis on exercised-based therapy that emphasizes consistent, active muscle movement. Examples include:
  - Lingual resistance exercises (IOPI)
  - Expiratory Muscle Strength Training (EMST)
  - McNeill Dysphagia Therapy Program (MDTP)

WHAT IS ‘‘USUAL CARE’’ IN DYSPHAGIA REHABILITATION: A SURVEY OF USA DYSPHAGIA PRACTICE PATTERNS

CARNABY 2013

- Data from new therapies suggests a stronger emphasis on exercise yields positive results that are superior to older ‘‘management’’ techniques of compensations and maneuvers.

- Although there is evidence supporting these active exercise approaches, it is unclear how many practicing SLPs are utilizing these techniques.

- Given this recent change in treatment emphasis, it is important to determine if practicing SLPs are incorporating ‘‘best practice’’ into their treatment approaches.

WHAT IS ‘‘USUAL CARE’’ IN DYSPHAGIA REHABILITATION: A SURVEY OF USA DYSPHAGIA PRACTICE PATTERNS

CARNABY 2013

- This study used a web-based survey method to target SLPs who treat adults with dysphagia in a variety of clinical settings throughout the US

- The ASHA’s Special Interest Group 13 was used as the sampling frame because it provided a representative study population of experienced dysphagia clinicians.

WHAT IS ‘‘USUAL CARE’’ IN DYSPHAGIA REHABILITATION: A SURVEY OF USA DYSPHAGIA PRACTICE PATTERNS

CARNABY 2013

254 surveys were analyzed

- Assessment information:
  - 55% SLPs reported using either self-developed assessment/outcome measures
  - 44% used facility-developed measures
  - 37 % reported using published peer reviewed tools
  - 29 % reported that they used only published tools with statistically confirmed validity

WHAT IS ‘‘USUAL CARE’’ IN DYSPHAGIA REHABILITATION: A SURVEY OF USA DYSPHAGIA PRACTICE PATTERNS

CARNABY 2013

Therapy techniques used were derived from:

- 92% postgraduate CEU courses
- 70% learned from colleagues
- 44 % self developed
- 20% from professional journal articles

WHAT IS ‘‘USUAL CARE’’ IN DYSPHAGIA REHABILITATION: A SURVEY OF USA DYSPHAGIA PRACTICE PATTERNS

CARNABY 2013

- 47 different techniques were recommended
- 3.9% were based on physiologic abnormality identified from data provided
- 96 different combinations were recommended with no single combination exactly repeated
- 58% did not match the patient's specific dysphagic symptoms
- 13% of interventions were exercise based

WHAT IS ‘‘USUAL CARE’’ IN DYSPHAGIA REHABILITATION: A SURVEY OF USA DYSPHAGIA PRACTICE PATTERNS

CARNABY 2013

- 72% of SLPs believed the patient improved more than 50% of the time (improving diet)
- 19% of SLPs reported return to full oral diet without restrictions as a typical outcome of therapy
- Common causes for not regaining pre-injury diet:
  - Progression of premorbid disease
  - Cognition

WHY DO CLINICIANS CHOOSE THE THERAPIES AND TECHNIQUES THEY DO? MCCURTIN 2017

	Item/Technique	% always/freq. use	% never/rarely use
1	Texture modification	82.8	0
2	Thickening liquid	77.6	2.6
3	Positioning changes	72.4	4.3
4	Double swallow	46.5	12.0
5	Adapted utensils	44.8	13.0
6	Volume regulation	43.1	7.8
7	Physical support	35.3	21.6
13	Effortful swallow	22.4	36.2
21	Shaker maneuver	10.3	59.5

WHY DO CLINICIANS CHOOSE THE THERAPIES AND TECHNIQUES THEY DO? MCCURTIN 2017

Reason for using	% of responses	
It is suitable for my clients	31.8	71.0
Based on my clinical experience	28.2	
It is more concrete than abstract	11.0	
It is theoretically sound	8.3	13.4
Experts recommend it	5.1	
I learned it in school	4.9	4.9

An Exercise is an Exercise is an Exercise

Exercise Principles

- In the study of exercise science, there are several universally accepted scientific exercise training principles that must be followed in order to get the most from exercise programs
- These fundamental rules are the force behind the ability to change any system

Exercise Principles

- Individual differences
- Overload
- Specificity
- Progression
- Adaptation
- Use/Disuse
- Reversibility

Individual Differences

- Patient's impairments have a different etiology
  - Stroke
  - Parkinson's Disease
  - Cancer
  - Many others
- Patients have different pathophysiology
  - Imaging is necessary
- Patients have different availability
- Adapt therapy to the patient, not the patient to the program

Overload

- "Exercise efforts that do not force the neuromuscular system beyond the level of usual activity will not elicit adaptations. By challenging the system beyond typical use, adaptations occur to accommodate the increased demand. Engaging in exercise that is not intense enough to push the system beyond the level of activity to which it is accustomed will not result in adaptation." Burkhead 2007
- Examples:
  - Lip protrusion and retraction
  - Effortful swallow

The concept of "One Rep Max"

Maximum muscle force output during a single repetition is called "One Repetition Maximum" or "One Rep Max"

The number of reps that one can perform before fatiguing varies according to the percentage of the 1 RM

Performing an exercise where more than 30 reps can be completed does not efficiently increase muscle strength

% 1 RM	REPS
100%	1
80%	10
60%	15
50%	20
40%	25
30%	30
Inadequate intensity to generate strength increases	

Strength Training

- Early changes in strength training are generally the result of modifications in how the nervous system activates the muscle rather than a structural alteration in the muscle itself
- Improved performance may be the result of an increased number of motor units recruited or improved speed and coordination of motor unit recruitment
- These early alterations in neural activation can improve force production, coordination, and precision of movement.
- As a training program progresses, strength gains appear to be more the result of morphologic changes within muscle tissue (6 – 8 weeks)

Strength in swallowing

- What tools do we have to objectively measure strength?
  - For example: Current standard of care during a CSE is to have the patient push their tongue against a tongue depressor to determine strength. Well, how much should they push and how good are we at assessing this? Does experience make us better at figuring it out?
    - Clark 2003: Over all a weak to moderate correlation exists between the therapist vs IOPI measurements. In the study those with minimal experience (students) were better than experienced raters (0.696 verses 0.395).

Strength in swallowing

- The second issue is, are me measuring the right thing?
  - Bu Sha 2000: Using a tongue protrusion task, normal adults generated the greatest force on a transducer 2.5 cm behind the teeth.
  - Pharyngeal residue
    - Strength?
    - Spasticity/Tone?
    - ROM?
    - Sequencing?
    - TBR?

Fatigue

- Kays 2010
  - Studied 22 healthy adults
  - Two age groups (young adults and older adults)
  - Measured P max and Endurance (50% of Pmax) twice before the meal and once after? Why the difference? No explanation
  - Provided a meal of a bagel with peanut butter, carrot sticks, and 8 oz of chocolate milk
  - All subjects showed reduced strength and endurance post meal.
- Young adults showed greater decrease in anterior tongue Pmax than older adults

Fatigue

- Ravenhorst-Bell 2012
  - N=20 all older adults
  - Served the regular lunch at an ALF
  - Measured Pmax and Endurance (50% of Pmax)
  - After the meal both Pmax and Endurance improved to the level of statistical significance.

Solomon 2006: “The dilemma remains to explain and document the persistent issue of fatigue in the dysphagia literature

Fatigue

- Wouldn't we need to answer a few questions before using the word to describe our patient?
  - Was there sufficient force before the task began?
    - Fatigue verses some other condition
  - How much force is needed to perform the activity?
  - How was it measured before the activity started?
  - How was it measured before the "f-word" was documented?
  - What impact does "fatigue" have on the system?

Specificity

- This principle simply states that exercising a certain body part or component of the body primarily develops that part
- Change in performance related to exercise involves a complex constellation of both central and peripheral adaptations. Adding specificity to any training regimen directs the focus toward a common goal.

Specificity

- Swallowing is the best exercise for swallowing.
  - Practicing something incorrectly only reinforces the incorrect pattern. “Perfect practice makes perfect.”
- Having someone with dysphagia consume a meal during therapy and simply counting the coughs, throat clears, etc., yields nothing. The patient is simply practicing a dysphagic swallow while the therapist is present.
  - “Diet trials” and observation of meal times day after day needs to be removed from the tool box

Specificity

- Most motor skills do not generalize across tasks. Research supports this concept in swallowing therapy.
- Several of studies have documented increased size of cortical representation of the tongue following completion of a tongue protrusion activity. However, it does the activity does not result in an increase was of representation of the “cortical masticatory area/swallow cortex. This indicates task specificity of plasticity in the motor cortex. It is important that training involves exercise that replicates the desired task: swallowing.

Progression

- In order to continue to make gains the load must be systematically and progressively increased
- "To maximize gains over time, the absolute value of load placed on the muscle must be progressively adjusted over the course of the exercise program. This practice, known as progressive resistance, is necessary to maintain the relative physiologic load as a proportion of the maximal force-generating capacity." Burkhead 2007
- How can this be accomplished in dysphagia therapy?

Progression

- Bolus selection is determined based on the patient's swallowing dysfunction:
  - Increasing viscosity places an increase demand on pressure and force (Miller 1996, Watts 2015, Nagy 2015)
    - Possibly challenges strength/pressure required
- Increasing bolus size requires a faster swallow
  - Challenges timing, triggering, sequencing (Chi-Fishman 2002, Barikroo 2015)
- Bolus taste and temperature impact the swallow as well (Pelletier 2006)
- If the patient's swallow behavior does not meet the desired target consider changing the bolus (size, viscosity, taste, temperature)

Adaptation

- The activity must be performed with adequate duration for the system to realize there is a need for change.
- "Exercise task must exceed usual levels of activity and be performed for an adequate duration (within a session and over time) to trigger the need for changing the system's response. With that premise, intensity can be defined on three levels:
  - the mechanical or resistive load placed on the system
  - amount or repetition of practice during the training regimen, and
  - duration of training over time.

Each of these levels of intensity has proven critical in bringing about neuromuscular adaptations."

Adaptation

- The length of therapy sessions and the time focused on actual treatment within each session matters
- For every minute you spend chatting with your patient you are wasting a minute of therapy
- Payment continues to decrease our available time with patients
- Make the most of the time you have

“Use it or lose it” (Use/Disuse)

- Animal studies have shown again and again how plasticity can be induced in the brain through extended training
- Synaptogenesis in the contralateral side of the brain in the presence of unilateral damage has occurred and been found to be dependent on behavior after the injury. Think about constraint therapy.
- Of course, the issue is there must be intentional good use. If simply random swallowing improved swallowing the fact that we swallow saliva and eat would be the only therapy we would ever need.

“Use it or lose it” (Use/Disuse)

- Practicing something incorrectly may only reinforce the aberrant patterns of behavior
- We have to use a skill or movement with increased competence-which can be measured in various ways such as efficiency and accuracy.
- Robbin 2008:
- “The immediate lesson for the swallowing clinician, however is that training-even the training of a patient who is aspirating and at high risk for pulmonary or other health consequences-appears preferable to merely observing and documenting.”

Reversibility

- Effects of training are lost when training stops and can gain the effects
- Detraining occurs within a relatively short time period after training ceases
- Performance reductions may occur in as little as two weeks or sooner

An Exercise is An Exercise Is An Exercise

PART 2

Neuroplasticity

Factors supporting the rehabilitation potential of many patients with dysphagia:

- Dysphagia research and clinical evidence indicate that positive neuroplastic changes are possible even in the presence of chronic conditions, multi-system atrophy and advanced age.

Neuroplastic improvements following disease can include:

- Reorganization of cortical representation
- Increased efficiency of residual pathways
- Greater use of alternative descending pathways

Neuroplastic Principles

When developing a treatment plan it is necessary to consider neuroplastic principles to maximize treatment impact

- Use it or lose it
- Use it and improve it
- Repetition matters
- Intensity matters
- Plasticity is experience specific
- Salience
- Difficulty
- Transference

Kleim & Jones, JSLHR, 2008

Robbins et al, JSLHR 2008

Use It Or Lose It

Factors that must be considered:

- What is being trained?
- How is the system being challenged?
- Is the system being used and engaged to maximize functional outcomes?

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Use It And Improve It

- With increased biological activity future functioning is enhanced.
- The object is not to merely use a function but to use it with increasing competence (efficiency/accuracy)
- Simply swallowing does not improve the swallow
- Goals must be determined and performance evaluated

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Repetition Matters

- Neural Substrates may be modified by extensive and prolonged practice
- Considerations for therapy:
  - number of repetitions
  - number of treatment sessions
  - treatment duration
  - speed of presentation

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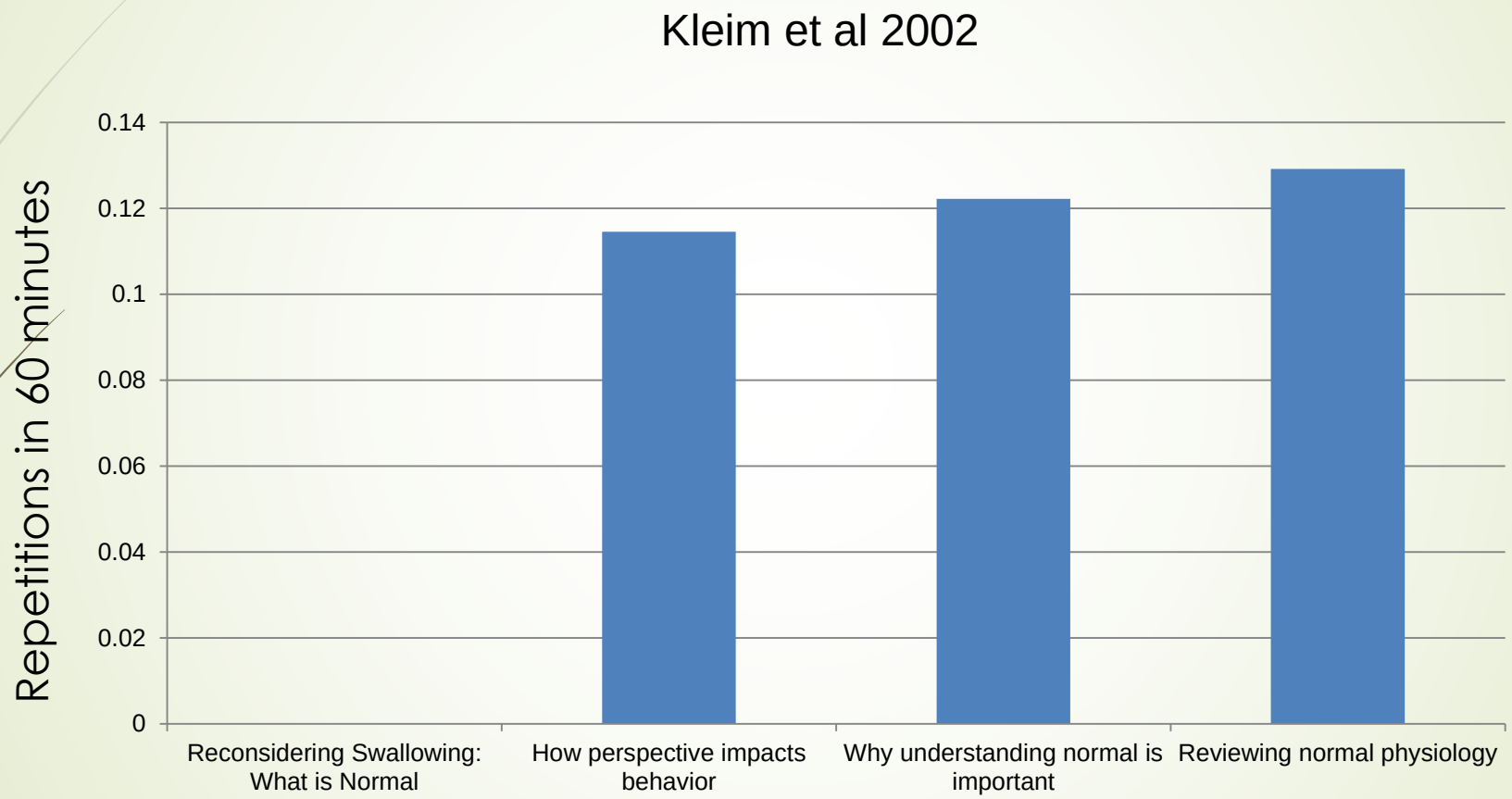
TRIALS


Kleim et al 2002
Repetitions in 60 minutes
0.14
0.12
0.1
0.08
0.06
0.04
0.02
0
Reconsidering Swallowing: What is Normal
How perspective impacts behavior
Why understanding normal is important
Reviewing normal physiology

Intensity Matters

- No adaptions will occur if the muscle(s) is not forced beyond "typical" activity level

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Specificity (Experience Specific)

- Consider what is being repeated and work to enhance accuracy, quality, coordination and strength
- Changes only occur in the neural substrates engaged in the trained behavior
- The type of training will determine the functional outcome (skill versus strength versus endurance)

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Salience

Only behaviorally relevant experiences cause neuroplastic changes

- Best induced with movement that is purposeful and related to the behavior being trained
- The patient needs to be attentive to task
- The patient needs proprioceptive awareness of trial accuracy (errors/ success)

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Difficulty

- Difficulty level must be achievable to the patient
  - If the goal is unattainable the patient may lose interest and lose motivation
- Difficulty level must challenge the patient
  - This ensures attention and interest
- There must be systematic progression in targets
  - Progressive strength/load requirement
  - Increase demands on timing and coordination
  - Move to more complex/challenging food stimuli

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Transference

- Will training other systems target your goal and lead to functional improvements in swallowing?
- Is the training provided transferring to the targeted swallowing task?

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Conclusion

DETERMINING CLINICAL APPROPRIATENESS OF INTERVENTION

- What are my patient's wishes?
- What physiological Deficits that need to be rehabilitated?
- What are the research based interventions?
- Do I have a strong rationale?

Suggestions for Critical Evaluation of an Approach

- Where did you hear about it? Most responsible researchers will willingly offer their work for peer review and critique as a necessary step in working toward acceptance. Thus, research that eventually makes it to press has a much higher chance of presenting unbiased and well-substantiated information.
- Critically evaluate even what you read in journals with a keen eye on methodology, underlying theoretical support, and evaluative measures.
- Search the literature for replications of the research that supports the technique.
- Consider the professional and personal implications of utilization of the technique as being equally important as the possible implications for patient care.
- Recall your responsibility to the ASHA *Code of Ethics* under which we all practice.

Huckabee 1997

In order to effectively treat dysphagia we must rely on EBP