An Enhanced Rapid Review of the Applicability of Ultrasound in the Assessment of Sucking, Swallowing, and Laryngeal Function in the Pediatric Population

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Background: The COVID-19 pandemic has renewed interest in the use of ultrasound (US) among Speech and Language Therapists (SLTs) working with infants and children. As a portable and non-invasive tool, US mitigates the risk of aerosol generation provoked by other instrumental swallowing assessment tools and could be a valuable addition to the dysphagia assessment toolkit. A recently published rapid review of the evidence focusing on the use of US in the assessment of swallowing and laryngeal function highlighted its potential utility in the adult population.

Aim: To determine the applicability of US as an instrumental assessment tool for sucking, swallowing, and laryngeal function in the neonatal and pediatric populations.

Methods/Procedures: A rapid review of six electronic databases was conducted to identify articles studying the use of US to assess sucking, swallowing, or laryngeal function compared with varied reference tests. Abstract screening was completed according to predefined inclusion/exclusion criteria with 10% of articles screened by a second rater. Data were extracted using a predeveloped form. A modified QUADAS-2 tool was used to assess the quality of the studies. Results from the included studies were summarized into a table and grouped into sucking, swallowing, and laryngeal function studies.

Results: Twelve studies using US in the assessment of swallowing or laryngeal function met inclusion criteria. All were peer-reviewed primary studies across a range of clinical populations and with a wide geographical spread. Five studies had an overall low risk of bias, but the remaining seven had at least one domain where risk of bias was judged as high. All studies were judged to have high applicability. The two studies assessing swallowing varied in terms of aims and use of US. The studies assessing laryngeal function mainly investigated vocal fold movement and laryngeal pathology. Sensitivity and specificity data were not reported. For balloon dilatation cases, further primary outcome measures were preoperative and postoperative EAT-10 scores.

Office-Based Transnasal Oesophagoscopy: Evaluating the Safety, Efficacy, and Application in Head and Neck Cancer Patients

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Introduction: Transnasal Oesophagoscopy (TNO) is an approach to inspect the upper aerodigestive tract, especially in the head and neck cancer (HNCA) population that present with dysphagia. Our aim was to investigate the safety, efficacy and applicability of office-based TNO in patients presenting with dysphagia, and surveillance of those with a previous HNCA.

Materials and Methods: We conducted a retrospective case series of TNO procedures performed between August 20, 2019, and September 15, 2020. Cases were extracted from our outpatient database, including details on patient demographics, indications, intervention (biopsy/balloon), pain scores, and Eating Assessment Tool-10 (EAT-10, 0–40) scores. Primary outcome measures for all cases were pain/discomfort scores (nose, throat), % complications, and procedures abandoned. For balloon dilatation cases, further primary outcome measures were preoperative and postoperative EAT-10 scores.

Results: Twenty-five (25) office-based TNO procedures were performed, with a same-day discharge (SDD) rate of 96% (24/25) and no reported complications. TNO was well tolerated with median nose and throat pain scores of 5 and 3.5, respectively (n = 21), and 2 procedures were abandoned prematurely. The most common indication for TNO was dysphagia in 88% (22/25). Common intraoperative
Head Rotation as an Effective Compensatory Technique for Dysphagia Caused by Unilateral Cervical Osteophyte

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Introduction: Dysphagia is common in patients with cervical osteophyte, and the effects of surgical resection of the osteophyte have been reported. However, these approaches resulted in several complications and a high likelihood of the recurrence of osteophytes. Therefore, we aimed to determine whether head rotation as a compensatory technique is effective on dysphagia caused by unilateral cervical osteophyte.

Materials and Methods: We retrospectively analyzed videofluoroscopic swallowing studies (VFSS) data and images obtained between January 2017 and April 2021 in one university hospital. The cases which showed pharyngeal stasis by mechanical obstruction due to cervical osteophytes were selected. They were divided into a unilateral skewed osteophyte group and a diffused central osteophyte group, which was confirmed by laryngoscopy or CT. The effect of head rotation swallow was investigated and ‘effective’ was defined as reduced pharyngeal residues and improved pharyngeal passage. Fisher’s exact test was used for statistical testing.

Results: Among the 2876 VFSS cases, we found 48 patients who had abnormal cervical spines causing dysphagia. The osteophytes were centrally located in 36 patients and unilateral in the remaining 12 patients (eight on the left side, four on the right side). Ten of the unilateral located patients showed improvement of pharyngeal bolus passage and decrease of residues when they swallowed with head rotation toward osteophyte side but none of the central located patients showed any effect. There was a statistically significant relationship between head rotation swallow and skewed cervical osteophyte ($p = 0.001$).

Conclusions: Head rotation swallowing technique was safe, easy, and effective for dysphagia with unilateral cervical osteophyte and it is advisable to try this method prior to considering the surgical approaches.

Larger Volumes of Mildly Thick Liquids Lead to Greater Pharyngeal Residue

Session Title: E-Poster Rating Session A1: Swallowing Physiology, Neurophysiology, and Imaging

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Introduction: Thickened liquids are commonly used as a compensatory strategy for people with oropharyngeal dysphagia. However, the safety benefits of thickened liquids may come at the expense of increased residue. Recent studies suggest that it is important to distinguish the influence of bolus volume on pharyngeal residue with thickened liquids. Thus, we investigated whether quantitative measures of swallowing efficiency differed within participants, between cup-sip and teaspoon administration of mildly thick liquids.

Methods: Twenty healthy participants underwent videofluoroscopy (VFSS) using mildly thick 20% w/v barium prepared with a xanthan gum thickener. Stimuli were served in cups containing 40 ml under two conditions: (1) self-administered, natural cup-sips and (2) self-administered spoons-full using a 5-cc capacity teaspoon. VFSS was captured at 30 frames/s. Sip volume was derived from pre- and post-sip cup weights and confirmed larger sip volumes for the cup (13.2 ± 4.0 ml) vs. teaspoon condition (4.5 ± 1.16 ml). The ASPEKT method was used to count the number of swallows per bolus and take pixel-based measures of residue in the valleculae, pyriform sinuses, and other pharyngeal locations. Wilcoxon signed rank tests tested the hypotheses that the number of swallows and amount of pharyngeal residue would be greater in the cup-sip condition.

Results: Single swallows per bolus were the norm for both conditions. Significantly greater vallecular residue, measured in anatomically scaled units, i.e., %/(C2-4)$^2$, was seen in the larger...
volume cup-sip condition vs the teaspoon condition: \(0.51 \pm 0.66\) vs. \(0.27 \pm 0.29\%(C2-4)^2, p < 0.05\).

**Conclusion:** These results suggest that larger volumes of mildly thick liquids contribute to greater pharyngeal residue, especially in the valleculae. The delivery of mildly thick liquids by teaspoon may be an appropriate consideration if the goal is to avoid increased residue when using thickened liquids to reduce aspiration risk.

### Larger Volumes of Mildly Thick Liquids Influence Specific Swallowing Timing Parameters

**Session Title:** E-Poster Rating Session A1: Swallowing Physiology, Neurophysiology, and Imaging

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**Introduction:** Bolus volume and viscosity are both thought to influence swallowing physiology. In their work establishing reference values for swallowing, Steele et al. observed differences between mildly, moderately, and extremely thick liquids. However, their protocol involved cup-sips of mildly thick, vs teaspoons of the thicker consistencies. Sip volume may, therefore, have contributed to the differences observed across stimuli. We investigated whether measures of swallow timing differ between cup-sips and teaspoons of mildly thick liquids. We hypothesized that larger volume cup-sips would show longer hyoid-burst-to-upper-esophageal-sphincter-opening intervals (HYB-UESO), UESO durations, and laryngeal vestibule closure (LVC) durations. We did not expect swallow reaction time (SRT) or time-to-laryngeal-vestibule-closure (TTLVC) to be sensitive to volume.

**Methods:** Twenty healthy adults underwent videofluoroscopy (VFSS) and swallowed mildly thick 20% w/v barium prepared using a xanthan gum thickener. Stimuli were served in cups containing 40 ml under two conditions: (1) self-administered, natural cup-sips and (2) self-administered teaspoons-full. VFSS was captured at 30 fps. Sip volume was derived from pre- and post-sip cup weights and confirmed larger volumes for the cup condition (13.2 ± 4.0 ml vs. 4.5 ± 1.16 ml). Using the ASPEKT method, we obtained quantitative timing measures. Wilcoxon signed rank tests were conducted to identify differences between conditions.

**Results:** We found a significantly shorter HYB-UESO interval in the cup-sip condition (117 ± 47 ms vs 149 ± 41 ms, \(p < 0.05\)). UESO duration was significantly longer for cup-sips (525 ± 90 ms vs 477 ± 73 ms, \(p < 0.05\)). No significant differences were found for SRT, TTLVC or LVC duration.

**Conclusion:** Larger volumes of mildly thick liquid do influence some swallow timing parameters, including the HYB-UESO interval and UESO duration. Other swallow timing parameters do not appear to be sensitive to volume effects.

### Supraglottal Characteristics During Speech in the Elderly: Relationships with the Swallowing Function

**Session Title:** E-Poster Rating Session A1: Swallowing Physiology, Neurophysiology, and Imaging

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Background: With aging, there may be supraglottal constriction, which can be considered harmful during speech. Conversely, it is an important defense mechanism of the airway during swallowing.

Objectives: To describe the supraglottal characteristics, pharyngeal characteristics of swallowing, and their relationships in the elderly.

Materials and methods: The study evaluated 60 speech and swallowing nasofibroscopy examinations of 60 healthy elderly individuals (41 females and 19 males), mean age 68.8 years, considering: presence and degree of increased volume of the vestibular folds, median and anteroposterior supraglottal constriction in speech, as well as the occurrence of premature posterior escape, delay in the pharyngeal stage of swallowing, applying the scales Dysphagia Outcome and Severity Scale and The Penetration and Aspiration Scale.

Results: There was an increase in the volume of vestibular folds in 47 elderly individuals (81.04%), median constriction in sustained speech in 55 (91.67%), anteroposterior constriction in sustained speech in 54 (91.53%), and median constriction in speech in 43 (91.49%). Swallowing was normal (level 6 and 7 DOSS scale) in 53 elderly individuals. In the liquid consistency, there was one case of laryngotracheal aspiration, premature posterior escape occurred in 29 individuals (51.78%), and delay in the pharyngeal phase occurred in 15 (26.78%). All supraglottal features were associated with premature posterior escape. The increased volume of vestibular folds was associated with liquid consistency ($p = 0.036$); median constriction was associated with pudding ($p = 0.019$) and solid (0.041) consistencies, and anteroposterior constriction was associated with pudding consistency ($p < 0.05$).

Conclusion: The increased volume of vestibular folds and supraglottal constriction during speech were shown to be related to premature posterior escape during swallowing in the elderly, requiring further studies to better understand this relationship.

Deglutition & Ambulation

Session Title: E-Poster Rating Session A1: Swallowing Physiology, Neurophysiology, and Imaging

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Introduction: Deglutition and locomotion are functions sharing similar mechanism, associating automatic and voluntary control. Ambulatory status in frailty patient (1) or multiple sclerosis patients (2) seems to be a risk factor for dysphagia. We proposed to explore ambulation and oral intake modalities in our population.

Materials and Methods: Retrospective evaluation of prospective data from first examination in “swallowing disorders” consultation at a Tertiary University Hospital between January 2017 and June 2021. Age, genre, body mass index, new Functional Ambulation Categories (nFAC), Functional Oral Intake Scale (FOIS), oral condition, presence of tracheotomy or feeding tube, respiratory infections and/or weight variations, and results of instrumental examination (FEES and/or VFS) were extracted from medical files.

Results: During these 54 months, 1537 questionnaires were found, concerning 1310 patients. Full data are available for 1524 which 1103 results were extracted from medical files. Full data are available for 1524 which 1103 patients (91.53%) have an altered dental condition (842/1103). Thirty-four patients wear tracheotomy, 185 have a feeding tube (with 23 have both). Sixty percent have experimented one or more swallowing disorders complications (respiratory infection and/or weight variation). Majority of instrumental examination were realized in standard conditions, but for few patients, personal wheelchair (manual or electric) or stretcher/bed were used. Two-third of patients with no ambulation limits (FAC 0) have no restrictive oral intake, whereas only near than 13% of no decannulation class (FAC 0) could. The major limit of this study was an attrition bias with a low level of patients with head & neck cancer and a high level of patients with neurological conditions.
Effect of Chewing on Modulation of Pharyngeal Motor Excitability

Session Title: E-Poster Rating Session A2: Swallowing Physiology, Neurophysiology, and Imaging
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Introduction: Mastication and swallowing functionally interact during the eating process. Previous studies have indicated that peripherally evoked swallowing is suppressed during chewing. The present study aimed to assess the effect of mastication on swallowing-related neural pathways in humans.

Materials and methods: Twenty young healthy volunteers (10 men; mean age 28.1 years old) participated in the experiment. They were intubated with an intraluminal catheter for recording pharyngeal electromyography (EMG). We also recorded masseter muscle EMG. Each participant underwent baseline transcranial magnetic stimulation to evaluate cortico-pharyngeal and cortico-masseter motor evoked potentials (MEPs). Next, they were asked to perform the following tasks: freely chewing gum and repeatedly swallowing 1 ml of water. Each of the two 3-min tasks was conducted twice. In the repeatedly swallowing task, the number of swallows was determined as the same as that counted in freely chewing task. MEPs were immediately measured following each task and there was a 10-min rest period between tasks. The average changes in amplitude and latency were analyzed using an ANOVA for factors of Task (chew vs. swallow) and Trial (1st vs. 2nd) with post hoc t-tests.

Results: A two-way repeated measures ANOVA with factors of Task and Trial revealed no significant interaction. However, a significant effect of Task was found in the pharyngeal MEP data (Fig. 1, p < 0.05). Subsequent post hoc tests showed that the pharyngeal MEP after the swallowing task was significantly higher than that after the chewing task. There were no significant changes in MEP latency.

Conclusions: Although the number of swallows was the same as in the swallowing task, we found no increase in pharyngeal MEP after the chewing task. This implies that masticatory movement may suppress swallowing-related activity in the pharyngeal motor circuit at the cerebral cortex level.

Differences in Swallow Timing Measures Across Different Low Concentration Thin Liquid Barium Stimuli

Session Title: E-Poster Rating Session A2: Swallowing Physiology, Neurophysiology, and Imaging
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Introduction: Prior studies suggest there may be differences in swallow timing measures across different barium concentrations. These include longer pharyngeal transit time and longer upper esophageal sphincter opening (UESO) duration with higher barium concentrations. Whether different barium products of identical concentration result in similar swallowing physiology remains unknown. This is an important consideration, as ready-to-serve products designed specifically for oropharyngeal swallowing examinations (i.e., Varibar) are not available globally. The aim of this study was to identify which, if any, physiological timing parameters differ in healthy individuals as a function of (a) barium concentration and (b) barium product.

Methods: 20 healthy adults (10 female) aged 22–54 (mean 27.5) underwent a videofluoroscopy (VF), which included 8 comfortable sips of thin liquid barium: 2 sips each of 20% w/v barium prepared with E-Z-Paque® powder and liquid Polibar Plus®; and 2 sips each of 40% w/v barium prepared with the same products. Stimulus order was randomized. The VF lateral view recordings were spliced to bolus level clips and analyzed in duplicate by trained raters, blind to participant and task. Key frames were identified according to the ASPEKT Method, and timing measures were derived. Non-parametric Friedmans tests were used to look for within-participant differences across the repeated conditions.

Results: No significant differences were found across the four stimuli for five key timing parameters: swallow reaction time, the hyoid-burst-to-UESO interval, UESO duration, time-to-laryngeal-vestibule closure (LVC), and LVC duration.

Conclusion: Timing parameters remained stable across four liquid barium stimuli varying in concentration and brand. Knowing that timing measures are not bespoke to specific 20% w/v and 40% w/v barium products allows clinicians and researchers to compare quantitative VF measurements against reference values found in the literature.

Age, Frailty, Swallowing and Nutrition: A Pilot Internet Study

Session Title: E-Poster Rating Session A2: Swallowing Physiology, Neurophysiology, and Imaging
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Introduction: Eating and drinking are important for physical and mental health. Research has shown that many people living in the community have unreported swallowing problems. Small studies have suggested that there are changes in the physiology of swallowing as age increases. This study reports results from the pilot phase of a larger study on age, frailty, swallowing, and nutrition.

Methodology: A survey was sent to colleagues and contacts asking them about their ability to swallow (4QT), nutrition (SNAQ), and

Fig. 1: Amplitude changes in pharyngeal and masseter MEPS following chewing and swallowing tasks (*p < 0.05)
frailty (Clinical Frailty Score) as part of this they were asked to undertake a timed water swallow test (detailed instructions were provided). Informed consent was requested from all and Ethics approval was granted by University College, London.

Results: One hundred and eighty-three (183) people responded to the request to complete the survey. The mean and mode age was 27.82 and 20 years (Range 18–86), and 136 (74%) were female. 10% reported a cough on swallowing, 25% taking longer to eat than in the past, 21% have had to change their diet, and 7% reported a voice change after swallowing. Correlation was found between number of sips (mean 8.2, mode 2) and time taken to drink (mean 13.3 mode 4 secs) 150ml water ($p < 0.001$), and there was also correlation between age and number of sips taken ($p < 0.001$) and time taken to swallow the water ($p < 0.001$).

Conclusion: We used this approach specifically to investigate the changes in the physiology of swallowing with age. The results suggest that the use of the internet is a feasible way to undertake such a study. The results show that swallowing physiology changes with age. The number of people reporting swallowing problems needs further investigation. However, the population was predominantly female and young. This pilot study will aim to recruit more people of an older age. A larger more international study is planned to commence later in 2021 or early 2022.

Dysphagia Assessment in Acute Stroke: A National Survey of Organizational Practice Linked to Stroke Registry Data

Session Title: E-Poster Rating Session B1: Dysphagia Assessment: Screening, Clinical Evaluation, and Instrumental

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Introduction: Stroke-associated pneumonia (SAP) is one of the key challenges of stroke unit care. Early dysphagia screening and clinical swallowing evaluation (CSE) are associated with reduced incidence of SAP (Bray et al.). Our study aimed to reveal variations in screening and CSE practice and explore their association with SAP.

Methods: Speech Therapists from 166 stroke units in England and Wales were surveyed about dysphagia screening, CSE, and instrumental assessment in acute stroke. Survey data were then linked to the Sentinel Stroke National Audit Program (SSNAP). Linear regression analysis estimated the association between dysphagia screening and CSE and SAP incidence.

Results: Survey completion rate was 68% ($N = 113$). There was variation in models of dysphagia screening and screening tools used. There were patterns of consistency in the CSE. The most frequent reasons for delay in screening and CSE were identified. Ninety-six percent of teams had access to Videofluoroscopy (VFS) and/or Fiberoptic Endoscopic Evaluation of Swallowing (FEES) but these assessments were not typically used in the first 7 days of a patient’s admission. Multivariable analysis showed no evidence of association in incidence of SAP when using screening tools that used water only compared to multiple consistencies ($B = 0.688$, 95% CI $= 2.912–1.536$), or when using written guidelines for the CSE compared to not using written guidelines ($B = 0.671$, 95% CI $= 1.567–2.908$).

Conclusions: There is variation in dysphagia screening and CSE yet no evidence of an association with SAP. There is potential for greater use of instrumental swallowing assessments when clinically indicated during the first 7 days of admission. Larger sample sizes and empirical studies may be needed to show a link between dysphagia assessment variation and SAP.

Experiences of Dysphagia-Trained Nurses in the Screening and Early Management of Swallowing in Acute Stroke

Session Title: E-Poster Rating Session B1: Dysphagia Assessment: Screening, Clinical Evaluation, and Instrumental

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Background: Nurses are often trained to screen swallowing in acute stroke admissions using validated tools. A small number of more comprehensive tools allow nurses to recommend oral intake including modified diets and fluids based on a strict assessment proforma.

Aims: We aimed to find out the experiences and opinions of nurses trained to use the recently validated Dysphagia-Trained Nurse Assessment in acute stroke.

Design: Semi structured interviews with Dysphagia-Trained Nurses from one acute stroke unit.

Methods: Nine dysphagia-trained nurses were recruited between November 2018 and February 2020, identified by maximum variation and convenience sampling to ensure a broad range of demographics, working patterns and experience. Semi-structured interviews were carried out with participants during usual shift patterns, in a quiet room on the acute stroke unit by a research and clinical Speech and Language Therapist. Thematic analysis was conducted and agreed by two coders and a summary of themes was verified by the participants.

Results: Six main themes were identified relating to the role, pathway, the assessment, training, and confidence. The role was highly regarded, bringing professional benefits such as job satisfaction and career development. Nurses also identified that it was an essential role in acute stroke for the health and wellbeing of patients. There were challenges during busy periods when the use of the assessment with certain patients was questioned. Training was deemed crucial for the role, support was appreciated, confidence and skills developed with experience and training updates were valued.

Conclusions: Nurses who are trained to conduct comprehensive dysphagia assessments in acute stroke value the role. Further research is needed to quantify the impact that dysphagia-trained nurses have on clinical outcomes.

Reliability of Auditory-Perceptual Cough Assessment Among Novice Clinicians

Session Title: E-Poster Rating Session B1: Dysphagia Assessment: Screening, Clinical Evaluation, and Instrumental

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Introduction: It is critical to assess cough in people with dysphagia and aspiration. Auditory-perceptual assessments of cough may be one feasible method to grossly assess cough function, but little is known about its reliability. The primary aim of this study was to examine the reliability of auditory-perceptual cough assessment among novice clinicians. Secondarily, we examined the effects of a standardized
cough training program on the reliability of auditory-perceptual cough assessment.

**Methods:** Twelve graduate speech-language pathology students were prospectively recruited to blindly rate 10 cough descriptors for 100 randomized cough audio clips. The students then completed a standardized perceptual cough training program and then re-rated the same 100 coughs. Intraclass class correlation coefficients and Cohen’s Kappa were used to statistically analyze inter- and intra-rater reliability pre- and post-training. Reliability was classified as ‘poor’ if estimates were \( \leq 0.5 \), ‘moderate’ if \( 0.5 \leq 0.75 \), ‘good’ if \( 0.75 \leq 0.9 \), and ‘excellent’ if \( > 0.9 \).

**Results:** Before training, inter-rater reliability was poor for 1 descriptor and moderate for 1 descriptor, while intra-rater reliability was poor for 1 descriptor, moderate for 5 descriptors, and good for 4 descriptors. Post-training inter-rater reliability was poor for 5 descriptors, moderate for 4 descriptors, and good for 1 descriptor, while intra-rater reliability was moderate for 4 descriptors and good for 6 descriptors.

**Conclusions:** Without training, novice clinicians exhibit acceptable intra-rater reliability for the majority of perceptual cough descriptors whereas inter-rater reliability is relatively poor. However, perceptual cough training yields generalized improvements to both inter- and intra-rater reliability (Fig. 1). Future research is needed to determine the validity of auditory-perceptual cough assessment and the impact of more extensive training and experience on reliability.

**Endoscopic Swallowing Assessment in Amyotrophic Lateral Sclerosis: Description and Efficacy of the Protocol at Hospital Garcia De Orta**

**Session Title:** E-Poster Rating Session B1: Dysphagia Assessment: Screening, Clinical Evaluation, and Instrumental

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**Introduction:** Dysphagia can be both a form of presentation and a sequel of Amyotrophic lateral sclerosis (ALS), a neurodegenerative disease that affects the upper and lower motor neurons. It has an important impact on quality of life and increases the risk of complications such as malnutrition and aspiration pneumonia, contributing to a raise in the mortality of these patients. The goal of this study is to evaluate the characteristics of swallowing in patients with ALS and verify the effectiveness of the assessment protocol applied.

**Materials and Methods:** Retrospective study of all patients diagnosed with ALS who were evaluated in the nutrition and swallowing department at Hospital Garcia de Orta from 2014 to 2021. 79 patients were included, 42 men and 37 women, with a mean age of 68.71 ± 10.57 years.

**Results:** All patients had at least one altered swallowing phase, mostly pharyngeal (58.9%), 10% had already had an aspiration pneumonia prior to the first swallowing assessment and 75.9% had weight loss \( (M = 14.03 \pm 8.13 \text{ kg}) \). 8 patients had total interruption of the oral intake in the first assessment. Upon re-evaluation, all patients had indication for percutaneous endoscopic gastrostomy (PEG). The ones submitted to PEG (83.5%) had a higher life expectancy \( (3.26 \pm 2.16 \text{ vs } 1.81 \pm 1.34 \text{ years}) \), without statistical significance \( (p \geq 0.05) \). 2 patients had respiratory infections after the first swallowing assessment, which later were confirmed not to have complied with the guidelines. The early onset of dysphagia was correlated with a decrease in average life expectancy, with statistical significance \( (p = 0.88; p = 0.00) \).

**Conclusions:** Our swallowing assessment protocol proved to be effective in controlling the occurrence of aspiration pneumonia. The swallowing assessment and re-evaluations are an important contribution to avoid complications and worsening of the motor condition due to weight loss.

**A Service Evaluation Examining the Clinical Benefits of FEES (Fiberoptic Endoscopic Evaluation of Swallowing) and Its Sue During the Covid-19 Pandemic**

**Session Title:** E-Poster Rating Session B2: Dysphagia Assessment: Screening, Clinical Evaluation, and Instrumental

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**Introduction:** At the start of the COVID-19 in March 2020 within the trust, the use of FEES was ceased with immediate effect as its nature as an aerosol-generating procedure (AGP) leading to a high risk of viral transmission between patients and staff undergoing and performing FEES (Bolton, L et al. 2020. Non-COVID patients were also unable to undergo FEES at this time so a wider effect was felt. When national guidance was then released in July 2020, we were then able to restart the service and a large proportion of these patients were COVID positive.

**Primary objective:** To identify impact of COVID-19 on the provision of FEES to our patients.

**Secondary objective:** To identify the key clinical aims and outcomes of FEES to support the use of FEES during COVID-19 surges.

**Methods:** Retrospective non-patient identifiable data collated from departmental spreadsheets.

**Numbers of FEES carried out during:**
- Pre-COVID-19 November 2019 to March 2020.
- March 2020 to July 2020 with no FEES.
- July 2020 to November 2020 post-new guidance.
- January 2021 to April 2021 surge.

**Results:** The number of FEES performed since the service was reinstated during the first wave of COVID-19 has increased by 89% indicating a high need for FEES for the diagnosis and management of dysphagia. The biggest impact on patient care was being able to reinstate oral intake in almost 50% of patients undergoing FEES, which will potentially impact on reducing the need for alternative nutrition and hydration as well as contributing to increasing quality of life.

**Conclusion:** The use of FEES also highlights the importance of identifying the need for specialist opinions and contributing to medical management plans, both of which can impact on facilitating...
The Use of SDQ-Questionnaire in Combination with FEES-First Results and Case Series

**Session Title:** E-Poster Rating Session B2: Dysphagia Assessment: Screening, Clinical Evaluation, and Instrumental

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**Objectives:** To assess the improvement of patients with dysphagia associated with various other etiologies, before and during treatment.

**Methods:** Eight patients (6 females, 2 males) with the complaint of swallowing disturbances who underwent a full swallowing survey at the Panikolaou-Hospital (Thessaloniki, Greece), Veria-Municipal Hospital (Veria, Greece) and Klinikum Wolfsburg (Wolfsburg, Germany) participated. They all filled in the SDQ-Questionnaire. The collected data included patient characteristics, medical history, and the results of an oromotor examination and a fiberoptic endoscopic evaluation of swallowing (FEES). The SDQ results were compared to the FEES and oromotor examination findings. All patients have been treated with Tongue Range-of-Motion and Oromotor Control Exercises.

**Results:** The responses to the questions in the SDQ were highly correlated with the findings of the oral part of the oromotor. Items on the laryngopharyngeal phase reliably assessed dysphagia symptoms in correlation to the FEES examination.

**Conclusions:** The SDQ is a sensitive and accurate tool for identifying patients with true swallowing disturbances arising from different etiologies and for indicating the need for more in-depth instrumental swallowing evaluations. It allows not only the evaluation of dysphagia of the patients, but it can be used during the treatment and rehabilitation.

**Key Words:** Swallowing disturbances, fiberoptic endoscopic evaluation of swallowing (FEES), dysphagia, questionnaire, swallowing disorder.

How Valid and Reliable is the Dysphagia Outcome and Severity Scale when Translated into Another Language?

**Session Title:** E-Poster Rating Session B2: Dysphagia Assessment: Screening, Clinical Evaluation, and Instrumental

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The Dysphagia Outcome and Severity Scale (DOSS) objectively assesses dysphagia via instrumental exam while considering holistically a person's activity function: diet, nutrition and independence, as per ICF (International Classification of Functioning, Disability and Health). Although a valid and reliable scale in English, this study investigated if the DOSS remained valid and reliable when translated into another language (Swedish).

**Method:** Translation occurred using a multistep process, based on World Health Organization guidelines. Translation validity was calculated with Scale—Content Validity Index (CVI). Criterion validity was measured against International Dysphagia Diet Standardization Initiative Functional Diet Scale (IDDSI-FDS). Reliability, calculated by Intraclass Correlation Coefficient (ICC), based on 14 SLPs ratings of ten published patient cases (IDDSI-FDS).

**Results:** Scale translation validity demonstrated high linguistic equivalence (CVI = 0.99) and high applicability in a Swedish context (CVI = 0.94). Criterion validity showed high DOSS-S correlation with IDDSI-FDS (rs = 0.89, p < 0.01). Reliability: ICC > 0.90.

**Conclusion:** Results indicate that DOSS demonstrates high validity and reliability when translated into another language. Further research investigating clinical validation of the DOSS-S is required.

Dysphagia and Laryngopharyngeal Reflux: Do Clinical Findings Correlate with those of Oropharyngeal Ph-Monitoring?

**Session Title:** E-Poster Rating Session B2: Dysphagia Assessment: Screening, Clinical Evaluation, and Instrumental

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**Introduction:** Dysphagia and globus sensation are common symptoms of laryngopharyngeal reflux (LPR). Diagnostics remain challenging, as available methods are mostly subjective, poorly reproducible, and not validated. Uncritical or diagnostic use of PPI should be avoided due to side effects.

Materials and Methods: Data of 207 patients (mean age 52.6 ± 16.3, female 62.3%) who presented for oropharyngeal 24 h pH-monitoring (OPM) were analyzed. Symptoms for reflux were classified by “Reflux Symptom Index” (RSI, norm < 13) and laryngoscopic abnormalities by “Reflux Finding Score” (RFS, norm < 7). Then, OPM was performed in all patients using “Restech Dx system” and “Ryan Score” (RS) was calculated from the number and duration of reflux episodes (pH < 5.5/ < 5.0).

**Results:** The main symptoms reported by more than 75% of the patients (RSI) were: globus sensation, mucus excess, clearing of throat, and annoying cough. 43% had an elevated RS (≥ 9.41) in the upright position on OPM, nearly half of them severely (RS 80.0). In contrast, only 8% had an abnormal RS in supine. In laryngoscopy (according to RFS), over 85% of patients showed posterior laryngitis and mucosal erythema. However, no correlation was found between RFS and RS or between RFS and RS; only 39% of the 87 patients with abnormal RFS had an elevated RS. There was also no correlation between RSI and RS. Thus, RS was elevated in only 43% of the 147 patients with elevated RSI.

**Conclusions:** Although globus sensation occurred frequently and RSI and RFS were elevated, there was no correlation with the high prevalence of LPR in OPM. Despite some questions that still need to be answered, OPM is a valuable diagnostic tool to assess oropharyngeal pH. Systematic consideration of all findings allows planning of a targeted and individualized therapy.
Screening for dysphagia after covid-19: psychometric properties of the volume-viscosity swallow test

Session Title: E-Poster Rating Session B2: Dysphagia Assessment: Screening, Clinical Evaluation, and Instrumental

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Introduction: The Coronavirus Disease (COVID-19) pandemic has had a deep impact on health systems across the world. Dysphagia after Covid is a new and emerging condition which has represented a challenge when trying to determine the best practice standards of care based on the current evidence.

Objectives: To determine prevalence of dysphagia and evaluate the psychometric properties of the volume-viscosity swallow test (V-VST) in a post-covid cohort of patients admitted in a Neurorehabilitation unit for training myopathy, not for dysphagia.

Methods: A prospective single-center study was conducted in 49 post-COVID adult patients with no previous history of dysphagia. V-VST-index test was performed at the beginning of income, as well as a standardized videofluoroscopy study (VFSS)-reference test. Oropharyngeal residue was considered as an impaired efficacy sign; cough, fall in oxygen saturation and voice changes, signs of impaired safety. Sensitivity, specificity, positive and negative predictive values, accuracy, and likelihood ratios were calculated for V-VST results and compare with VFSS. Blinded raters performed separately both tests. Demographic health-related outcomes were also collected.

Results: Mean age was 62.9 (SD8.83). Mean days in ICU was 39.7 (SD 57.2), mean days with tracheostomy was 31.42 (SD20.9), mean days in Rehabilitation Dept was 19.5 (SD11.45), and mean day total income was 82.66 (SD36.13). The VVS-T obtained the following values to detect aspiration for nectar viscosity: sensitivity (Se) 80%, specificity (Sp) 65.6%. In a global analysis we obtained: Se 56.3%, Sp 70.8%, PPV 56.3%, VPN 70.8%, accuracy 65%. For residue pharyngeal perception, values obtained were Se18.8%, Sp66.7%, PPV27.3%, NPV 55.2%, accuracy 47.5%.

Conclusion: The study showed a 40% prevalence of dysphagia and a mild accuracy of the test, with acceptable specificity, but low sensitivity as screening test. It suggests an instrumental evaluation is mandatory in this kind of patients.

Characteristics and Validity of Rating Scales for the Assessment of Drooling in Parkinson’s Disease: A Systematic Review

Session Title: E-Poster Rating Session C1: Systematic Reviews and Meta-Analyses

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Background: Drooling is one of the most troublesome symptoms in people with Parkinson’s disease (PwP). Respiratory infection is one of several consequences. Although there are several scales that assess drooling in PwP, there is a lack of analysis of the characteristics and clinimetric properties, essential in assessing their suitability. This study aims to evaluate the characteristics, clinimetric properties, and clinical utility classification of the drooling scales for PwP.

Materials and Methods: A literature search independently through the CENTRAL, CINAHL, Embase, MEDLINE, SciElo, and SPEECH BITE databases was performed. Articles published until May 2021 were selected. For scales analysis, the consensus-based standards for the selection of health measurement instruments (COSMIN) and the International Parkinson’s Disease and Movement Disorders (MDS) were used.

Results: Six scales were identified: Drooling Impact Scale, Sialorrhea Scoring Scale, Drooling Severity and Frequency Scale, Drooling Rating Scale (DRS), Sialorrhea Clinical Scale for Parkinson Disease (SCS-PD), and the Radboud Oral Motor inventory for Parkinson’s disease—Saliva (ROMP-saliva). Only DRS, SCS-PD, and the ROMP-saliva were originally developed or adapted for PwP. All but ROMP-saliva present studied sample size limitations, incomplete analysis of reliability, poor validity, and lack of analysis of sensitivity to change. Only ROMP-saliva was classified as “recommended” for clinical utility according to MDS criteria.

Conclusions: Most scales are patient-reported outcome measures, enhancing the focus in the perception and experience related to drooling in PwP. The ROMP-saliva seems to be the only scale with relevant clinimetric properties (COSMIN criteria) with recommended clinical utility (MDS criteria). This study provides a necessary update in this area and highlights the need for scales with more in-depth clinimetric properties assessments.

| Criterion          | DIS | SSS | DSFS | DRS | SCS-PD | ROMP-Saliva |
|--------------------|-----|-----|------|-----|--------|-------------|
| Developed or adapted for PwP | X   | X   | X    | ✓   | ✓      | ✓           |
| Original language  | English | English | English | English | Spanish | Dutch       |
| Used in studies with PwP by other researchers beyond the original ones | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Internal consistency—Reliability (Cronbach’s alpha) | X | X | X | X | ✓ [0.78; 0.81] | ✓ [0.94; 0.96] |
| Test–retest Reliability | [0.90–0.96] | X | X | X | X | ✓ ICC |
| Content validity   | X   | X   | X    | ✓   | ✓      | ✓           |
| Construct validity | X   | X   | X    | ✓   | ✓      | ✓           |
| Convergent validity | X   | X   | X    | ✓   | ✓      | ✓           |
| Known-groups validity (hypotheses testing) | X   | X   | X    | ✓   | ✓      | ✓           |
| Cross-cultural validity | Portuguese | X | X | X | X | European Brazilian |
Effectiveness of Thickened Liquids in Adults with Oropharyngeal Dysphagia: A Systematic Review

Session Title: E-Poster Rating Session C1: Systematic Reviews and Meta-Analyses

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Objective: This systematic review aimed to evaluate the effectiveness of thickened liquids in improving the clinical outcomes of patients with oropharyngeal dysphagia.

Methods: We included randomized controlled trials or controlled clinical trials assessing the outcomes of thickened liquids among adults diagnosed with oropharyngeal dysphagia based on clinical or instrumental testing. Other study designs, trials involving participants with esophageal dysphagia, and studies that used rehabilitative swallowing exercises as comparators were excluded. We searched 13 databases and 5 trial registries for published and unpublished studies until April 10, 2021. We used the Cochrane Risk of Bias Tool to assess the risk of bias in the included studies. Random effects model was used to obtain pooled effect estimates.

Results: Of the 1783 studies screened, 12 met the eligibility criteria. Seven RCTs and 5 crossover trials evaluated the effects of thickened liquids on 1673 patients. Most trials included patients with neurologic conditions, used free access to thin liquids as comparator, and had aspiration pneumonia as primary outcome. Although thickened liquids reduced aspiration events (RR 0.19 [95% CI 0.09, 0.39]), they demonstrated no significant benefit in terms of reducing aspiration pneumonia rates (RR 0.29 [0.03, 2.74]), pharyngeal residue (RR 0.78 [0.58, 1.05]), time to resolution of dysphagia (MD 4.39 days [– 7.06, 15.8]), as well as improving total daily fluid intake (MD 0.21 L [– 0.03,0.46]) and patient-reported quality of life scores. Thickened fluids were not associated with more adverse events (RR 1.22 [0.93, 1.60]). However, patients on thickeners had low satisfaction and adherence to treatment.

Conclusion: Thickened liquids may not significantly improve clinical outcomes. The certainty of the evidence was low to very low due to high risk of bias, imprecision, and inconsistency. More high-quality studies and re-evaluation of current practice recommendations are needed.

Are Bubbles the Future of Dysphagia Rehabilitation: A Systematic Review Analyzing Evidence on the Use of Carbonated Liquids in Dysphagia Rehabilitation

Session Title: E-Poster Rating Session C1: Systematic Reviews and Meta-Analyses

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Introduction: Dysphagia poses a huge global health issue in our aging population, impacting patients through risk of aspiration pneumonia, malnutrition, airway obstruction and death but also huge psychological sequelae. The use of carbonated liquids (CL) for sensory enhancement in dysphagia rehabilitation, remains an area with limited research. This systematic review analyzes the current evidence in this area, attempting to draw conclusions for potential future use in clinical practice. Materials and Methods: A data search of PubMed, CINAHL, EMBASE, and Cochrane was undertaken by a trained professional in these databases. Abstracts were reviewed and chosen by 2 clinicians according to selected criteria. 5 papers were analyzed and their quality was assessed using the PRISMA standards. Results: Selected publications (1992–2019) had a mean average of 29.2 participants with existing neurogenic dysphagia. Despite the differences in study designs all used videofluoroscopy swallowing study (VFSS) to assess various outcome measures; these included pharyngeal transit time (PTT), pharyngeal retention (PR), and evidence of penetration/aspiration. Conclusion: CL in dysphagia rehabilitation. The heterogeneity of study designs specifically participants seems to be the main barrier toward this. While evidence is encouraging, further prospective studies standardizing patient cohorts, methodologies and quantitative outcome measures must be carried out. Longitudinal studies to examine the role of CL in rehabilitation potential and improvement of dysphagia over time are another area of interest. In conclusion, CL in dysphagia rehabilitation has a potential role but without firm evidence-based research, successful use in clinical practice cannot be implemented.

Dysphagia Interventions in Patients Post-glossectomy: A Systematic Review

Session Title: E-Poster Rating Session C1: Systematic Reviews and Meta-Analyses

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Introduction: Partial or total glossectomy can cause dysfunction on the swallowing of the patient. Speech & Language Therapists (SLTs) lack guidance on the evidence for treatment methods. The aim of this study is to investigate the evidence of the treatment approaches used in swallowing rehabilitation following surgical excision.

Materials and Methods: A systematic review was conducted using PRISMA statement, including studies from 9 electronic databases from 2011 to 2021. Two independent reviewers screened titles and abstracts and reached agreement on inclusion/exclusion of studies for further review. The methodological quality of included studies was evaluated using the Casp and JBI tools. The search was restricted to studies reported in English. Studies selected for the systematic review included rehabilitation techniques for swallowing disorders in patients following partial or total glossectomy.

Results: A total of 6 articles with 319 (n = 181 males, n = 138 females) patients underwent partial or total glossectomy met the inclusion criteria. According to the results, SLTs use direct and indirect therapy in order to improve swallowing disorders in patients post-glossectomy. The most common direct strategies used are diet modification, environmental arrangements, and head positioning. The most common indirect strategies used include thermal stimulation and lip, lingual, cheek and laryngeal exercises. Additionally, in one study ultrasound was used in dysphagia rehabilitation post-partial or total glossectomy.

Conclusion: Both direct and indirect therapies are used by SLTs in dysphagia rehabilitation in patients after partial or total glossectomy. The current study, however, underlined the need for further evidence on rehabilitation strategies for dysphagia improvement in patients after partial or total glossectomy.

The Effectiveness of a 15 Minute Oral: Motor Stimulation Protocol to Promote Oral Feeding in Preterm Infants—A Systematic Review

Session Title: E-Poster Rating Session C2: Systematic Reviews and Meta-Analyses.

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Introduction: Preterm infants are often delayed in attaining oral feeding. The 15 min ‘Fucile protocol’ is an oral motor stimulation intervention applied in preterm infants postmenstrual age (PMA) to promote oral feeding. The aim was to examine the effectiveness of the ‘Fucile protocol’ to promote oral feeding in preterm infants < 37 weeks PMA and to direct clinical practice and research.

Methods: All randomized (RCTs) and quasi-randomized controlled trials comparing this intervention with no intervention, standard care, sham treatment, or non-oral intervention in preterm infants were sought. Four electronic databases (CENTRAL, MEDLINE via PubMed, EMBASE, and CINAHL) were searched using the Cochrane Neonatal Review Group search strategy to February 2021. Studies were analyzed for risk of bias using Cochrane risk-of-bias tool (RoB 2)\(^2\). Further statistical analysis was performed using Review Manager 5.4 (RevMan, 2020)\(^2\). PRISMA\(^3\) flow diagram depicted the selection process of included studies.

Results: This review included 14 RCTs with two comparisons: Group 1: oral stimulation versus no intervention/standard care; Group 2: oral stimulation versus other non-oral stimulation intervention. Meta-analysis showed a statistically significant reduction in number of days to achieve exclusive oral feeding (mean difference (MD) = 7.37, 95% confidence interval (CI) = 12.60 to −2.14 days) (group 1), (MD = 7.20, 95% CI = 8.09 to −6.31 days) (group 2) and in duration of hospitalization (MD = −6.91 days, 95% CI = −9.96 to −3.85 days) (group 1), (MD = −3.62, 95% CI = −5.01 to −2.23 days) (group 2). Duration of parenteral nutrition for infants in group 2 was shorter (MD = −2.70, 95% CI = −6.80 to 0.68). No adverse events were reported. GRADE\(^4\) showed overall low methodological quality of the evidence.

Conclusions: The ‘Fucile protocol’ has a significant positive influence on the outcomes reported. Despite varying quality of evidence, it has potential to improve outcomes for this population.
Conclusion: Three studies only.

Methods: A systematic search for primary research published between 2014 and June 2020 was performed using electronic databases (The Cochrane Library, PubMed, Web of Science). Additionally, systematic reviews were searched to identify manuscripts published before 2014. Peer-reviewed studies in English and German were included if they evaluated treatment effects on swallowing and/or cough function.

Materials and Methods: A systematic search for primary research published between 2014 and June 2020 was performed using electronic databases (PubMed and Embase), of which 22 studies provided data for meta-analysis. Within-group analysis for hospital, rehabilitation, and nursing home settings revealed an increase in estimated overall prevalence of 36.5%, 42.5%, and 50.2%, respectively. No prevalence data were identified for the palliative care setting, and estimated prevalence for rehabilitation was based on few studies only. Methodological and clinical variations for type of assessment, diagnosis and type of hospital ward were explored through between-group analysis for the hospital setting, revealing non-significant between-group OD prevalence estimates. Between-group OD prevalence estimates were significant for type of assessment in the nursing home setting; however, estimates were based on three studies only.

A Systematic Review of Treatment for Dysphagia in Subjects with Parkinson’s Disease

Session Title: E-Poster Rating Session C2: Systematic Reviews and Meta-Analyses

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Introduction: Dysphagia in patients with Parkinson’s disease (PD) is prevalent. Optimal treatment of dysphagia is key to minimize complications, such as aspiration pneumonia. This systematic review assessed the current evidence of published treatments targeting swallowing and/or cough function.

Materials and Methods: A systematic search for primary research published between 2014 and June 2020 was performed using electronic databases (The Cochrane Library, PubMed, Web of Science). Additionally, systematic reviews were searched to identify manuscripts published before 2014. Peer-reviewed studies in English and German were included if they evaluated treatment effects on swallowing and/or cough in patients with PD. Information on treatment protocols, assessment methods, outcome parameters, and intervention effects was extracted. NHMRC levels of evidence and study quality (QualSyst tool) were determined. Publications were independently reviewed by two investigators. Discussion was undertaken to reach consensus agreement on data extraction and grading.

Results: A total of 36 studies were included. Considerable variability in treatment was identified. Most studies (67%) reported rehabilitative therapy methods including respiratory, motor, and skill-based approaches. Other methods, such as compensatory or adaptive strategies, were documented in the remaining studies. Levels of evidence ranged from IV (case series) to II (randomized controlled trials), with case series being the most prevalent study design (47%). In total, 22% of the studies were classified as level II research. Study quality ranged from poor (8%) to strong (53%).

Conclusions: There is some evidence for potential positive effects of diverse treatment methods on swallowing and cough function in patients with PD. However, the evidence is mostly based on case series of variable quality. This review emphasizes the need for more high-quality evidence to guide optimal treatment of dysphagia in patients with PD.

Patients’ Perception and Instrumental Assessment of Dysphagia and Dysphonia in Oropharyngeal Cancer: Preliminary Data

Session Title: E-Poster Rating Session D1: Neurogenic Dysphagia + Adult Non-neurogenic Dysphagia + Dysphagia Management

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Introduction: Radiotherapy (RT) and chemoradiotherapy (CRT) treatments, are associated with significant disturbances in voice and swallowing process. Attending these implications, is our intention to analyze and quantify possible relations between patient’s perception and objective measures.

Materials and Methods: Transversal quantitative study including 40 patients treated in IPO between 2015 and 2019. Inclusion criteria: patients with oropharyngeal cancer treated with RT and CRT with curative intent, at least with 1 year of follow-up. Exclusion criteria: previous disfunction of salivary glands; presence of dysphonia or dysphagia due to neurological or gastrointestinal conditions; voice and deglutition directed treatments; use of drugs that affects voice or deglutition. Patients’ perception was assessed by SWAL-QOL-PT, VHI-9i, EORTC C30, and QLQ-H&NC34. For phonation characterization GRBAS scale was used, nasality was scored in a four-point Likert scale, and acoustic analysis of vowels. Fiber-endoscopic evaluation of swallowing includes the following: (1) structural movement (velopharyngeal sphincter closure during speech and deglutition; vallecular, pyriform sinuses, base of tongue and pharyngeal wall presence of residues, hyperacute/acute saliva deglutition); (2) deglutition (5 mL of liquid and pudding, and ½ biscuits; posterior premature spillage; aspiration before, during, and after deglutition classified with Penetration–Aspiration Scale; pharyngeal residue; latency time to initiate deglutition; number of deglutition’s per bolus; and (3) sensitivity (soft palate, pharynx and arytenoids). In a next step, results of these analysis will be compared with clinical variables.

Results: We are collecting data.

Discussion/conclusion: We hope better understand the relationships between patient’s perception and instrumental evaluation of swallowing and voice in these patients. Outcomes of this study can provide a more realistic perception of the impact of these treatments in QOL.

Patients’ Perception and Instrumental Assessment of Dysphagia and Dysphonia in Head and Neck Cancer: What We Know?

Session Title: E-Poster Rating Session D1: Neurogenic Dysphagia + Adult Non-neurogenic Dysphagia + Dysphagia Management

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Introduction: Patients treated for HNC can experience compromise of orofacial functions. Nonetheless, the relation between both is not well known. We perform a SR studying the relationship between patient’s perception and instrumental assessment in dysphagia and dysphonia in HNC.

Materials and Methods: Two independent reviewers using the electronic databases PubMed and CINHAL performed a SR, following PRISMA statement. All articles with humans, up to August 2020, based on PICO strategy were included.

Results: Of the 3753 articles, we found 25 that met de inclusion criteria defined. In the nineteenth, we found only one publication, and in the last 10 years, we found 12 articles, showing that increased interest in this field. The studies designs were mostly cross-sectional (48%), and prospective (32%). Looking to the area of study, the majority were about deglutition (96%). The patients’ perception was assessed by symptoms specific questionnaires, like MDADI (26%) or SWAL-QOL (6%), H&NC35—11%), or with dichotomic questions (17%). The instrumental assessments were performed with videofluoroscopy (77%) or fiberoptic endoscopic (23%). Through this SR, 68% of the included papers reveal a significant relationship between patients’ perception and instrumental assessment. The most relevant relations found could be divided into four groups: (1) oromotor skills; (2) quantitative measure of distance and time; (2) safety; and (3) qualitative descriptors.

Discussion/Conclusion: The results of this SR show inconsistencies in correlations between patients’ perception and instrumental assessment. Nevertheless, it was possible to bring out some insights about several aspects. Findings like swallowing residues and biomechanical alterations demonstrate a clear relationship with patients’ awareness. It’s important to continuing this type of work, analyzing to clarify the interceptions and the impacts of this disturbance in the clinical practice.

Efficacy of Surgical Treatment for the Rehabilitation of Oropharyngeal Dysphagia Related to Close to the Brain Stem Cranial Nerves Damage. A 8 Cases Series

Session Title: E-Poster Rating Session D1: Neurogenic Dysphagia + Adult Non-Neurogenic Dysphagia + Dysphagia Management

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Introduction: Swallowing disorders related to brain stem or high-level cranial nerves lesions are a major issue for the quality of life. Although some patients show spontaneous resolution, sometimes after a 2 to 3 years delay, a significant percentage does not recover despite intensive rehabilitation. The aim of this work is to evaluate the efficacy of the association of: (1) lateral pharyngectomy (which principle is the resection of the insensitive and non-contractile pharynx), with (2) myotomy of the upper esophageal sphincter, and (3) laryngeal suspension, in patients suffering from swallowing disorders after failure of conventional rehabilitation techniques.

Materiel & methods: Eight patients were taken in charge by our multidisciplinary team of ENT and PRM between October 2013 and November 2020. They first participated in intensive rehabilitation and then underwent this surgical procedure. The preoperative and postoperative follow-up included a clinical evaluation with flexible endoscopic, esophageal manometry, videofluoroscopic evaluation, as well as pharyngeal video-manometry. The final evaluation of swallowing was based on a set of clinical arguments such as normal feeding, removal of the gastrostomy, and on patient self-evaluation questionnaires.

Results: Preoperatively, 6 patients were fed exclusively by gastrostomy without oral intake. After one year, four resumed normal feeding and were weaned from the gastrostomy. One had pleasure feeding, and one is still on early evolution. In two patients who had previously oral intake with pneumopathies related to aspiration, there was significant improvement in swallowing and stasis, allowing safe normal feeding. Six patients presented a resolving postoperative complication (mainly haematoma).

Conclusion: In this small series, swallowing surgery, combined with rehabilitative measures, was successful in treating persistent oropharyngeal dysphagia related to high-level cranial nerve damage or brain stem lesion.

Bihemispheric Motor Cortex Connectivity to the Jaw and Tongue Muscles after Unilateral Stroke in Young and Aged Rats

Session Title: E-Poster Rating Session D1: Neurogenic Dysphagia + Adult Non-neurogenic Dysphagia + Dysphagia Management

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Introduction: Corticobulbar plasticity of oral motor control after stroke is not well understood. Age, an independent predictor of post-stroke dysphagia, may be an important factor for post-stroke oromotor plasticity as neuroplasticity may be reduced with age. We sought to determine the impact of unilateral stroke and age on oromotor cortical plasticity by examining the volume of the sensorimotor cortex that activates the jaw and tongue muscles in both hemispheres.

Methods: Using the unilateral middle cerebral artery occlusion rat stroke model, intracortical microstimulation (ICMS) was used to map regions of sensorimotor cortex that activate tongue and jaw muscles in both hemispheres. F344xBN rats (7mo and 30mo) underwent stroke or sham surgery, and ICMS mapping 8 weeks later. Swallowing was assessed by videofluoroscopic swallow study (primary outcome: bolus area).

Results: In the aged group, the volume of cortex that activates the tongue in the damaged hemisphere was reduced 8 weeks after stroke (aged sham = 4.73 mm³, aged stroke = 0.85 mm³, p < 0.001), and moderately correlated with swallowing function within the aged stroke group (Pearson’s r = 0.74, p = 0.008). Stroke in the aged group was also associated with an increased jaw representation in the intact hemisphere (p = 0.009). Significant changes in map size were limited to the aged group, yet both age groups exhibited increased stimulation thresholds in the damaged hemisphere (p = 0.007).

Conclusion: Stroke was associated with a significant loss of functional connectivity between the motor cortex and the tongue muscles, and loss was greater with age. This reduced cortical input may represent reduced volitional control of the lingual musculature. Increased motor thresholds may further decrease oromotor muscle recruitment.
Oculopharyngeal Muscular Dystrophy: Not so Rare Condition in Specialized Consultation

Session Title: E-Poster Rating Session D1: Neurogenic Dysphagia + Adult Non-neurogenic Dysphagia + Dysphagia Management

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Introduction: Oculopharyngeal muscular dystrophy (OPMD) is a rare condition, with a prevalence around 1/100 000. It is an adult onset disease, with first signs started between 40 and 70 years old. The genetic abnormality was found in 1998, it corresponds to a triplet extension in chromosome 14 gene coding for polyadenylate-binding protein nuclear 1 (PABPN1). We explored frequency of OPMD in our swallowing disorders consultation, and extracted information about patients with OPMD: year of birth, genre, year of consultation, instrumental exam type and their results, swallowing disorders complications.

Materials and Methods: We retrospectively review data collected prospectively between January 2017 and June 2021 from our swallowing disorders consultation, and extracted information about patients with OPMD: year of birth, genre, year of consultation, instrumental exam type and their results, swallowing disorders complications.

Results: On the 1310 patients evaluated during the observed period, 14 (1%) have a OPMD diagnosis. Seven patients were male. Mean age was 63.1 ± 11.3 years (51.5–74.0) at first consultation. On instrumental exploration, all patients present pharyngeal stasis (FEES & VFS) and pharyngeal weakness (VFS). Only 4 patients have laryngeal penetration at first evaluation; the 2 patients with re-evaluation developed penetration within 2 years. Five patients have swallowing disorders complications (respiratory infection or weight loss), and 6 have also an esophageal dysfunction. Interestingly, 5 patients (35.7%) do not have diagnosis at first dysphagia evaluation, but 3 of them have an evocative family history. The final diagnosis was made after orientation to the Neuromuscular Disease Reference center.

Conclusion: OPMD is a rare disease but could represented 1% of dysphagia etiology in a specialized consultation. If diagnose is unknown before the consultation, familial history could be useful especially when pharyngeal stasis and weakness are observed.

Transesophageal Echocardiography–Dysphagia Risk in Acute Stroke (Tedras): A Prospective, Blind, Randomized, and Controlled Clinical Trial

Session Title: E-Poster Rating Session D2: Neurogenic Dysphagia + Adult Non-neurogenic Dysphagia + Dysphagia Management

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Background and purpose: Dysphagia is common in acute stroke and leads to worse overall outcome. Transesophageal echocardiography (TEE) is used in the diagnostic evaluation of stroke with regard to its etiology and is a known cause of postoperative dysphagia in cardiac surgery. The prevalence of dysphagia in acute stroke patients undergoing TEE remains unknown. The aim of the Transesophageal Echocardiography–Dysphagia Risk in Acute Stroke (TEDRAS) study was to assess the influence of TEE on swallowing among patients who have experienced acute stroke.

Methods: The TEDRAS study was a prospective, blind, randomized, controlled trial that included two groups of patients with acute stroke. Simple unrestricted randomization was performed, and examiners were blinded to each other’s results. Swallowing was tested using flexible endoscopic evaluation of swallowing (FEES) at three different time points in the intervention group (24 h before, immediately after and 24 h after TEE) and in the control group (FEES on three consecutive days and TEE earliest after the third FEES). Validated scales were used to assess dysphagia severity for all time points as primary outcome measures.

Results: A total of 34 patients were randomized: 19 to the intervention group and 15 to the control group. The key findings of the repeated-measures between-group comparisons were significant increases in the intervention group for the following dysphagia measures: (1) secretion severity score (immediately after TEE: \( P < 0.001 \); 24 h after TEE: \( P < 0.001 \)) and (2) Penetration–Aspiration Scale for saliva (immediately after TEE: \( P < 0.001 \); 24 h after TEE: \( P = 0.007 \)), for small (immediately after TEE: \( P = 0.009 \)) and large liquid bolus (immediately after TEE: \( P = 0.009 \); 24 h after TEE: \( P = 0.025 \)).

Conclusion: The results indicate a negative influence of TEE on swallowing in acute stroke patients for at least 24 h.

Evolution of Oropharyngeal Dysphagia in Patients with Severe Alteration of Consciousness

Session Title: E-Poster Rating Session D2: Neurogenic Dysphagia + Adult Non-neurogenic Dysphagia + Dysphagia Management

Prum, G; Mallart, R; Poppe, J; Verin, E
Rouen University Hospital

Introduction: The aim of this study was to evaluate the correlation between oropharyngeal dysphagia and feeding modalities and the evolution of consciousness in patients with a severe brain injury hospitalized in a rehabilitation center.

Methods: The clinical data of vegetative state or minimal conscious state patients hospitalized in a coma arousal unit were collected from 2012 to 2019. Feeding modalities were evaluated on Functional Oral Intake Scale (FOIS) and the evolution of consciousness on WHIM (Wessex Head Injury Matrix). Post-traumatic amnesia (PTA) was assessed using the Galvestone Outcome Amnesia Test (GOAT). Swallowing was assessed using video fluoroscopy (VFS), fiber endoscopy (FEES) or clinical examination by a speech therapist.

Results: Of the 93 patients considered, 68 were included. The mean initial GCS score was 6.25 ± 2.4 with a mean WHIM score of 24 ± 15 at admission. The GOAT score was 34 ± 24 and the mean duration of PTA was 85 ± 50 days (median 73 days). According to Pearson statistical analysis, there was a strong and significant linear correlation between WHIM scale and FOIS level \(( r = 0.60; p < 0.001 \)). This association was accentuated following the implementation of a quasi-systematic use of instrumental evaluation \(( r = 0.80; p < 0.001 \)).

Conclusions: Our results demonstrated that swallowing disorders evaluation was correlated to level of consciousness. This is an argument to include swallowing evaluation in consciousness evaluation in severe traumatic brain injury.
Prevalence and Evaluation of Oropharyngeal Dysphagia in SARS-COV2 Infection in Intensive Care Unit

**Session Title:** E-Poster Rating Session D2: Neurogenic Dysphagia + Adult Non-neurogenic Dysphagia + Dysphagia Management

**Poppe, J; Prum, G; Mallart, R; Verin, E**

Rouen University Hospital

**Introduction:** Oropharyngeal dysphagia (OPD) in intensive care is increasingly being studied in view of the increased risk of morbidity and mortality. The main objective of this study was therefore to evaluate the prevalence of dysphagia in ICU in patients with Covid-19.

**Methods:** This study was a cohort, observational, retrospective study of patients admitted to the intensive care units at the Rouen University Hospital Centre in France, in the context of the SARS-Cov2 epidemic.

**Results:** Over 4 months, 122 patients were hospitalized in Intensive Care Units at Rouen University Hospital for SARS-Cov2 infection and 58 were intubated and ventilated in whom 43 were assessed. Associated with screening, the presence of post-extubation dysphagia was found in 62.7% of intubated patients. In univariate analysis, there appeared to be a significant association between the presence of swallowing disorder and the severity of initial pathology (p = 0.011), duration of orotracheal intubation (p < 0.01), duration of curares (p < 0.01), depth of muscle weakness (p = 0.038) and initial CT severity (p = 0.033). The presence of dysphagia was not significantly associated with the length of hospitalization in intensive care. At the end of resuscitation, 22% of patients with dysphagia had a normal diet, 56% had an adapted per os diet, and 22% still had exclusive tube feeding. No inhalation pneumopathy following intensive care management was reported.

In conclusion, the prevalence of Covid-19-related OPD in ICU is high and should be assessed with a systematic screening to optimize nutritional management and reduce the risk of early complications.

Facilitation of Oral Sensitivity by Electrical Stimulation of the Faucial Pillars

**Session Title:** E-Poster Rating Session D2: Neurogenic Dysphagia + Adult Non-neurogenic Dysphagia + Dysphagia Management

**Hamzic, S1; Doerr, J1; Peters, L1; Prosielg, M2; Weber, S3; Yeniguen, M1; Tschernatsch, M1; Gerriets, T1; Juenemann, M1; Braun, T1**

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Dysphagia is common in neurological disease. However, our understanding of swallowing and its central nervous control is limited. Sensory information plays a vital role in the initiation of the swallowing reflex and is often reduced in stroke patients.

We hypothesized that the sensitivity threshold of the anterior faucial pillar could be facilitated by either electrical stimulation (ES) or taste and smell information. The sensitivity threshold was measured by ES in the anterior faucial pillar region. The measurement was repeated 5 min after baseline. Thirty minutes after baseline, the participants underwent a test for taste and smell. Immediately after the test, the ES was repeated.

Thirty healthy volunteers with a mean age of 27 ± 5.1 participated in the trial. Mean sensitivity threshold at baseline was 1.9 ± 0.59 mA. The values 5 min after baseline (1.74 ± 0.56 mA, p = 0.027) and 30 min after baseline (1.67 ± 0.58 mA, p = 0.011) were significantly lower compared to the baseline, but there was no difference between the latter (p = 0.321).

After 5 min, a potentially facilitating effect was found on oral sensitivity by ES of the faucial pillar area. Thirty minutes later, this effect was still present.

Airway Protective Treatments in Neurodegenerative Disease via Telehealth: Feasibility and Clinical Effect

**Session Title:** E-Poster Rating Session E1: Dysphagia Assessment (5)/Management (7)

**Sevitz, J1; Borders, J1; Dakin, A1; Kiever, B1; Alcalay, R2; Kuo, S2; Troche, M1**

1Teachers College, Columbia University; 2Columbia University Medical Center

**Introduction:** Airway protective deficits (swallowing and cough) are a pervasive consequence of neurogenerative disease, resulting in decrements to health and quality of life. Expiratory Muscle Strength Training (EMST) and Cough Skill Training (CST) have been identified as efficacious exercise-based treatment approaches to improve airway protection; however, utilization of these approaches is extremely low. Telehealth has the potential to increase access to care, yet, no airway protective interventions have been studied via telehealth in any neurodegenerative population. The purpose of this study was to determine the feasibility and treatment effect of EMST and CST via telehealth.

**Materials and Methods:** Twenty participants (4 females; age 48–83) with neurodegenerative diagnoses completed 4 weeks of EMST and 2 weeks of CST, which included two telehealth sessions and three days of home practice per week. Time taken to complete each treatment and obtain Maximum Expiratory Pressure (MEP) and Peak Expiratory Flow Rate (PEFR) was calculated to determine feasibility, defined as completing each treatment within 30 min. Treatment effect was defined as pre–post-treatment changes in MEP and PEFR.

**Results:** Time taken to obtain MEP and complete EMST was 17.48 min and to obtain PEFR and complete CST was 17.69 min. MEP significantly increased from 63.20 cmH20 (SD 22.5) to 85.7 cmH20 (SD 31.30) pre–post-treatment (p < 0.001). Single voluntary cough PEFR significantly increased from 293 L/min (SD 108) to 350 L/min (SD 31.30) pre–post-treatment (p < 0.001) and sequential voluntary cough PEFR increased from 285 L/min (SD 106) to 331 L/min (SD 132) pre–post-treatment (p < 0.001).

**Conclusions:** EMST and CST are feasible via telehealth and resulted in significant improvements to MEP and PEFR, respectively. This has important implications for expanding service delivery of critical airway protective interventions and reducing healthcare disparities in neurodegenerative disease.
Mealtimes are a Balancing Act: Health Professionals’ Views on the Quality of Life Impacts of Dysphagia and Potential for Improvements Through 3D Food Printing.

Session Title: E-Poster Rating Session E1: Dysphagia Assessment (5)/Management (7)
Smith, R1; Bryant, L1; Hemsley, B2
1The University of Technology Sydney; 2The University of Technology Sydney; The University of Newcastle

Introduction: Dysphagia and its interventions can impact negatively on a person’s quality of life, participation, and inclusion. 3D food printing is claimed to address the negative impact of modifying food texture upon its visual appeal for people with dysphagia, and improve their mealtime experiences. We aimed to examine the views of allied health professionals working with people with dysphagia on the impacts of dysphagia on a person’s quality of life, and on the feasibility of 3D food printing to improve mealtime experiences.

Materials/methods: Focus groups were used to determine the views of 15 allied health professionals who worked with people with dysphagia. The focus groups each lasted two hours and explored six key questions. Participants were also shown videos of the Foodini 3D food printer being used and photos of the resultant pureed food shapes. Data were analyzed using content thematic analysis and the results were verified with participants.

Results: Participants agreed that dysphagia could negatively impact a person’s choice and control, social engagement, physical safety, and food experiences. Participants recognized the potential for 3D food printers to increase choice and control in enabling people with dysphagia to ‘design their own mealtime’. However, they were unsure about the feasibility of people with dysphagia or their supporters using 3D food printers, and identified usability issues that need to be addressed before 3D food printers can be a widely accepted assistive technology.

Conclusion: Allied health professionals identified the potential benefits of 3D food printing to provide visually appealing texture-modified food. Dysphagia has complex impacts on a person’s meal-time-related quality of life and 3D food printers offer potential benefits. Usability issues may impede uptake and use of this new technology. Further research on the user experience of people with dysphagia and health professionals using 3D food printers is indicated.

Ultrasonic Doppler Imaging in Diagnosis and Follow-Up of Swallowing Disorders and Dysphagia

Session Title: E-Poster Rating Session E1: Dysphagia Assessment (5)/Management (7)
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The standard assessment of dysphagia in SLP practice is based on subjective observation. An objective examination is often necessary such as video fluoroscopy and nasendoscopy. We used the pulsed Doppler ultrasound imaging for evaluation of the tongue action to transport a bolus from the oral cavity into the oropharynx.

We examined 37 infants and 29 adults with swallowing disorder or dysphagia, referred for electrotherapy in our facility. The mid-sagittal section of the oral cavity was acquired with the linear ultrasound probe in submental position. We adjusted Doppler sensitive volume within the posterior horizontal belly of the genioglossus muscle at the boundary with the geniohyoid muscle. Patients were asked to drink water. Accordingly, we recorded the cranio-caudal projection of the velocity vector within the sagittal plane, representative of the tongue retroflexion. We also examined 128 infants and 38 adults, without any symptoms of swallowing disorder, who were referred to us due to the speech disorders. We used their normal swallowing parameters as a control. We applied electrotherapy for one month, utilizing the sub-mental assembly of the four percutaneous electrodes for supraphyoid interferential stimulation. We did the follow-up examination after completion of the 20 therapy sessions.

First examinations revealed various ultrasonic images of the swallowing disorders: hypokinetic tongue retroflexion, irregularity of the swallowing train, single or dual swallow pattern, and complete absence of swallowing. There was a significant positive correlation between the severity and staging of the dysphagia with the velocity of the tongue retroflexion. Follow-up revealed different modes of recovery, exhibited by the increased number of swallows, by increase of the velocity and by development of the regularity.

Ultrasonic Doppler imaging is a simple and accurate method for SLP practice, allowing the swallowing assessment in diagnosis and follow-up.
Interferential Current Stimulation for Swallowing Disorders in Chronic Obstructive Pulmonary Disease

Session Title: E-Poster Rating Session E2: Dysphagia Assessment (5)/ Management (7)

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Iizuka Hospital

Introduction: Swallowing function is affected in patients with COPD, putting them at risk of exacerbation. We previously reported the effectiveness of the repetitive saliva swallowing test (RSST) in predicting exacerbation risk. However, evidence on how to improve swallowing function in COPD is limited. Interferential current transcutaneous electrical sensory stimulation (IFC-TESS) is an emerging tool to enhance airway protection and increase swallow frequency. Its use in COPD has not been reported yet. Therefore, we performed a prospective study to investigate the safety, feasibility, and efficacy of IFC-TESS in COPD.

Materials and Methods: Stable COPD patients with an RSST of 5 or less who were hospitalized for yearly evaluation were included. The IFC-TESS was performed during lunch and dinner time (during which swallow frequency is maximized), 30 min per session, for 10 days. In order to maximize the effect of IFC-TESS, swallow screening results were compared before and after the 10-day intervention.

Results: Ten patients were included in the study. The intervention was performed safely. Regarding feasibility, the IFC-TESS could be performed daily without trouble in a respiratory medicine ward of an acute tertiary hospital. There was no specially trained nurse; the nurse who attended to the patient’s care on that day spent no more than a minute to initiate the session, which was manageable among the daily care. We chose to apply the stimulation during meal times, during which the pharyngeal movement is at its peak. It is expected to show similar effectiveness as to applying it during swallow training with a speech therapist. As for effectiveness, the EAT-10 score and RSST improved statistically significantly after intervention, and tongue pressure also improved greatly (Figure).

Conclusion: IFC-TESS during mealtimes may be a promising means of swallow intervention for patients with COPD who are easily fatigable and struggle to perform swallow training.

Can the Personal Costs of Dysphagia on Quality of Life, Participation, and Inclusion be Reduced Through Improved Food Design and 3D Food Printing? Views of Adults with Swallowing Disability

Session Title: E-Poster Rating Session E2: Dysphagia Assessment (5)/ Management (7)

Smith, R1; Bryant, L1; Hemsley, B2
1The University of Technology Sydney; 2The University of Technology Sydney; The University of Newcastle

Introduction: 3D food printing potentially improves mealtime safety and quality of life of people with dysphagia by addressing problems with food shape. The aims of this research were to examine the views of adults with dysphagia on their mealtime-related quality of life and on the potential for 3D food printing to improve mealtime experiences.

Materials and methods: Qualitative methods were used to examine the views and experiences of people with dysphagia (n = 7) and some of their supporters (n = 4). As well as being asked six key questions about the impacts of dysphagia, participants were shown a video of the Foodini 3D food printer being used and photos of the foods printed. They were then asked to discuss the usability of 3D food printing and the potential impact on their meals and mealtime-related quality of life. Inductive content coding and narrative analysis were used to identify content themes in the data.

Results: Participants reported a negative impact of dysphagia on (a) mealtime-related choice and control, (b) social engagement, (c) food experiences and enjoyment, (d) routines around mealtimes, and (e) physical safety. Participants described “paying the price” regarding time, money, and emotional costs of dysphagia. They viewed that 3D food printing may allow them to be more involved in designing their own texture-modified foods. However, they also identified several usability barriers to using 3D food printers and did not necessarily find the printed foods appealing.

Conclusions: People with dysphagia identified multiple impacts on their mealtime-related quality of life which may be addressed by improved access to attractive texture-modified foods. Perceived problems with usability and ambivalence about the attractiveness of the 3D printed food may impede use of this food technology. User-centered co-design of 3D food printers is needed to further the potential for 3D food printing to improve mealtime-related quality of life or mealtime safety.

Monitoring the Implementation Process of the IDDSI Framework. Supporting and Preventing Factors in Different Clinical Settings

Session Title: E-Poster Rating Session E2: Dysphagia Assessment (5)/ Management (7)

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Fachhochschule Wiener Neustadt

Introduction: The International Dysphagia Diet Standardization Initiative (IDDSI) is the global effort to establish a common
Results and Discussion:

The survey covered institutional characteristics and important factors regarding the implementation process according to the MAPA-plan (Monitor-Aware-Prepare-Adopt) as well as supporting and preventing factors that elucidate differences and similarities in implementation status respecting the clinical setting.

Materials and Methods:

An online survey was sent out to 74 clinical institutions offering neurological acute or post-acute rehabilitation care in a middle European country. The survey covered institutional characteristics and important factors regarding the implementation process.

Results and Discussion:

Descriptive data reveal that 39.3% of acute care and 25% of rehabilitation facilities are in the implementation process. 4.2% of all participants had already adopted IDDSI. Cross tabulations show that implementation teams and frequent team meetings have a positive impact on implementation progress. Although many there is a lack of multiprofessionalism within the implementation teams. Additionally, it appears that some IDDSI-levels are implemented more frequently than others.

Conclusions:

This work provides the first survey of a future longitudinal study monitoring IDDSI implementation on a large network of health care institutions in a central European country. There are more similarities than differences between the care settings in terms of prevailing general conditions, resources and intra-institutional processes. These insights help identifying supporting factors contributing to a successful adoption.

Scoping Review to Identify and Map Non-Pharmacological, Non-surgical Treatments for Dysphagia Following Moderate to Severe Acquired Brain Injury

Session Title: E-Poster Rating Session F1: Dysphagia Management: Treatments And Care Pathways

Eskildsen, S; Poulsen, I; Jakobsen, D; Riberholt, C; Curtis, D

Rigshospitalet (Copenhagen University Hospital)

Introduction:

Dysphagia is a common and critical consequence of acquired brain injury (ABI). Dysphagia rehabilitation has changed from mainly compensatory strategies to the re-training of swallowing function using principles from neuroscience. However, there are no studies that map the interventions available to re-train swallowing function in patients with moderate to severe ABI.

Objective:

To systematically map the accessible research literature to answer the research question: Which non-surgical, non-pharmacological interventions are used in the treatment of dysphagia in patients with moderate and severe ABI in the acute and sub-acute phase?

Methods:

The methodological framework for this scoping review is based on the methodology of Arksey and O’Malley and advancement by Levac et al. We made a comprehensive search of all the major biomedical and life science electronic databases. All studies reporting rehabilitative interventions within 6 months of injury for patients with moderate to severe ABI and dysphagia were included.

Results:

A total of 21,396 records were retrieved, and a final 26 studies were included following full-text review. The interventions were categorized into cortical or non-cortical stimulation of the swallowing network. Cortical stimulation interventions were repetitive transcranial magnetic stimulation, and transcranial direct current stimulation. Non-cortical were complex swallowing interventions, neuromuscular electrical stimulation, pharyngeal electrical stimulation, sensory stimulation, strengthening exercises, and respiratory muscle training.

Conclusion:

This scoping review provides an overview of rehabilitative dysphagia interventions for patients with moderate and severe ABI in the acute and sub-acute phase. Future studies could benefit from clear reporting of patient diagnosis and disease severity, the use of more standardized treatment protocols, and fewer but standardized outcome measures to enable comparison of effects across studies.

Rehab Works! Using Instrumental Assessment to Guide Targeted Dysphagia Rehab in Patients with Covid-19

Session Title: E-Poster Rating Session F1: Dysphagia Management: Treatments and Care Pathways

Doris, O; McRae, J

University College Hospitals London

Introduction:

Use of fiberoptic endoscopic evaluation of swallowing (FEES) and videofluoroscopy (VFS) for dysphagia diagnosis in patients with COVID-19 resumed in 2021 after aerosol-generating procedures policies were approved. Variations in dysphagia severity were identified and rehabilitation programs were implemented.

Methods:

Patients were referred to the acute SLT service for concerns about swallowing. All patients were seen by a dedicated SLT and received an initial clinical swallow evaluation (CSE) to identify dysphagia. Patient data were collated on a spreadsheet and those diagnosed with severe dysphagia as per instrumental assessment and were seen daily for intensive dysphagia rehabilitation. We present a case series analysis of dysphagia outcomes.

Results:

One hundred twenty-four (124) patients with COVID-19 were referred to SLT; all had elements of dysphagia impairments. 5 were diagnosed with severe dysphagia and 3 were suitable for intensive swallow rehabilitation. All were male, aged 58–68 years (average 62 years). All 3 were previously intubated and had a tracheostomy [average 34.3 days (range 11–79)], but were decannulated prior to therapy input. All demonstrated a severe sensorimotor dysphagia on initial FEES assessment including reduced base of tongue strength, reduced pharyngeal drive, and clearance. Patients were nil by mouth (NBM) with nasogastric feeding. Each had a repeat instrumental assessment (2 × FEES, 1 × VFS) within 4 weeks of daily swallow rehabilitation. Changes were seen in penetration–aspiration scale (PAS) (Fig. 1) and New Zealand secretion scale (NZS) scores (Fig. 2). All progressed to full oral intake with avoidance of long-term feeding tubes within 22–28 SLT sessions (average 25.3).

Discussion:

The use of instrumental assessments helped to identify specific sensorimotor impairments of dysphagia not apparent on CSE. This allowed targeted individualized daily interventions and progressed COVID patients from NBM to full oral intake.
Scoping Review: Perspectives of Physicians Working with Patients with Chronic Pain Dysphagia (CPD) and the Challenges They Face

Session Title: E-Poster Rating Session F1: Dysphagia Management: Treatments And Care Pathways

Flanagan, A; Gilheaney, O
Trinity College Dublin

Introduction: A number of patients with chronic pain (CP) also present with dysphagia. These patients are unable to swallow oral forms of medication resulting in difficulties managing pain. This poses a significant clinical problem for physicians in terms of their treatment as currently available treatment options have limitations.

Objective: This study explores the perspectives of physicians on this issue and the challenges they face. This study aimed to emphasize the unmet medical need that exists in this population.

Materials and Methods: A scoping review was conducted, to identify potentially relevant documents. The following databases were searched up to June 16th, 2020; PubMed, EMBASE, Web of Science, Cinahl, and ProQuest. In addition, reference lists were scanned. Hand-searches of conference abstracts were conducted to expand the search.

Results: Six hundred and fifty-five articles were identified. Following title, abstract and full-text screening one article was included in this study. Results found that the current analgesic treatment options available are perceived by physicians to have limitations. An unmet medical need exists in this population creating a medical inequity. Results also found that this area has been neglected in the evidence base. There is a lack of clinical guidelines provided which increases challenges faced by physicians.

Conclusion: Physicians face many challenges in the management and treatment of these patients including limited treatment options and a lack of clinical guidelines. Recommendations have been made at practice, policy, and research levels to tackle the unmet medical need that exists for patients with CPD and to overcome this medical inequity.

A Multidisciplinary Approach to Improving Dysphagia Management on the Stroke Unit

Session Title: E-Poster Rating Session F1: Dysphagia Management: Treatments and Care Pathways

Farragher, S; O’Kane, A
Belfast HSC Trust

Introduction: A number of incidences (11) relating to swallow safety were reported on the stroke ward between Nov’20 and Jan’20. Three incidences resulted in a change in the patient’s medical condition which raised concerns regarding the safety of Dysphagic patients on the ward. In addition to these concerns, the Public Health Agency in Northern Ireland released a document detailing preventable choking incidences within the trust and outlined 6 actions points for all SLT departments to address.

An dysphagia audit was then undertaken by SLT and dietetics teams both prior to and after the implementation of a training program by SLT on the stroke unit aimed at all staff involved in providing food to/feeding Dysphagic patients. The Dysphagia audit was conducted to establish current practices with regard to dysphagia management on the ward.

Materials and Methods:

- The audit was carried out on 33 dysphagic patients.
- SLT training then took place weekly over 2 months. This training enabled SLT to identify any areas of concern reported by the MDT and these concerns were then also addressed as part of the project.
- A “choking alert” poster was developed which alerted staff/visitors which patients were dysphagic.
- A Dysphagia awareness week was held which included dysphagia quizzes for all staff and prizes.
- Relaunch of a safe discharge bundle for dysphagic patients.
- To improve the safety of patients at mealtimes, only regionally approved terminology was used by SLTs in relation to level of supervision patients required.
- The 6 action points given by the PHa were addressed and reported.
Results:

A change in medical staff during the audit was thought to account for the decrease in correct prescription of thickener and modification of medications.

Conclusions: The dysphagia audit and subsequent MDT training was effective at improving the overall safety of dysphagic patients on the ward. Regular auditing and further training if required has been planned for 6 months time.

The Reality of Adapting Acute SLT Services to Covid-19 Needs: A Reflection on Experience Against Expert Consensus

Session Title: E-Poster Rating Session F1: Dysphagia Management: Treatments And Care Pathways

Doris, O; McRae, J
UCLH

Introduction: As COVID-19 progressed around the world, it was clear that the virus traveled through aerosol and SLTs dealing with communication and swallowing difficulties were vulnerable to exposure. Over 17 months, 2 major COVID-19 waves were experienced by a specialist acute service. The SLT team faced new experiences and challenges and reflected on their practice against the Global COVID-19 Consensus Statements for SLTs (Freeman et al., 2021). This set recommendations for workforce preparation, management of communication and swallowing functions.

Methods: The SLT team met on 3 occasions to consider the requirements for staff working on ICU with COVID-19 patients. In July 2021, these experiences were compared against the 33 ranked statements with gaps, variations, and requirements for future service provision being identified.

Results: Our service aligned with 25 out of 33 statements. See table 1 for breakdown. PPE and AGP considerations were significant in the initial wave but were embedded in routine practice by the second wave. Additional service requirements not considered in the consensus once AGP risks were managed, were the impact of PPE on communication, interventions for swallowing and communication and selection criteria for FEES, including guidance for post-extubation screening of laryngeal impairments.

Discussion: While there is value in having international recommendations, there were several unknowns about the disease process. The continuous changes in medical practices made our SLT services responsive without time for planning or reflection. The urgent need was for upskill training of staff with no ICU experience. Limited time and capacity reduced access to routine supervision, self-care, and annual leave. For second-wave planning, our service identified the need for group reflective case discussions and prioritization of mental health and wellbeing as essential to staff support. We welcome a review of the consensus recommendations.

Hard to Swallow? A Review of the Quality of Dysphagia Care Provided to Patients with Parkinson’s Disease Admitted to Hospital When Acutely Unwell

Session Title: E-Poster Rating Session F2: Dysphagia Management: Treatments And Care Pathways

Freeth, H1; Koomson, D1; Goodwin, A2; Srivastava, V3

123
Abstract

Estimates of the prevalence of dysphagia in Parkinson’s Disease (PD) vary. Reasons for this include a lack of awareness, recognition, and documentation of the condition. The assessment of indicators of dysphagia is important, as the inability to swallow can lead to dehydration, malnutrition, and weight loss. Patients with PD have a high rate of admission to hospital, and screening for dysphagia at the point of admission would provide an opportunity for earlier intervention.

The aim of the study was to explore multidisciplinary care and organizational factors in the process of identifying, screening, assessing, treating, and monitoring the ability to swallow in patients with PD admitted to hospital.

All UK hospitals were asked to report the details of patients with PD admitted to hospital over eight weeks. From this, up to four patients per hospital were sampled for detailed review. The clinician caring for the patient at admission completed a questionnaire and returned this alongside copied extracts of the case notes. These data were peer reviewed by a multidisciplinary group of clinicians to assess the quality of dysphagia care patients had received. In addition, organizational data and the views of service users were collected.

Five hundred five (505) clinician questionnaires were analyzed, and 344 sets of anonymized case notes were peer reviewed; this included 126 patients with dysphagia. Organizational questionnaires were returned from 177 hospitals. Several areas of concern were highlighted in line with expectations for this group of patients, broadly relating to issues with the documentation of swallowing status; the screening of patients for dysphagia at admission; the referral of patients with swallowing difficulties to speech and language therapy; and the provision of information at discharge.

The report, which makes 11 recommendations for clinicians and management to implement in practice, highlights there is room for improvement in the quality of dysphagia care.

Effect of Food Lubrication on Swallowing in Patients after Head and Neck Cancer Treatment: A Preliminary Study

Session Title: E-Poster Rating Session F2: Dysphagia Management: Treatments And Care Pathways

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Introduction: Artificial saliva is one of the treatment options for hyposalivation. However, its therapeutic efficacy is often temporary as it is quickly removed from the oral cavity. Therefore, this research aimed to check the effect of two food lubricants—yam (Colocasia esculenta) and water yam (Dioscorea alata)—on the swallowing physiology of patients with hyposalivation after the treatment of head and neck cancer (HNC).

Materials and Methods: This study was approved by the Human Research Ethics Committee. The 13 patients selected were treated for HNC and complained about swallowing and hyposalivation. The salivary flow test was performed with and without mechanical stimulation and application of the Summated Xerostomia Inventory. Swallowing changes were assessed through videofluoroscopy, and patients were offered nectar, pudding, and solid food consistencies with and without food lubrication. The Dysphagia Outcome and Severity Scale, Penetration–Aspiration Scale, and Eisenhuber scale were applied. Measurement of oral and pharyngeal transit time and analysis of lubricant palatability were performed.

Results: 60% of the patients had mild dysphagia, 33.3% swallowing with functional limitation, and 6.7% mild-moderate dysphagia. The Eisenhuber residue scale showed a significant residue decrease ($p = 0.015$) in the vallecula area for liquid consistency using water yam lubricant. There was a significant residue decrease ($p = 0.018$) in the pyriform sinuses for liquid consistency with both lubricants. In the penetration and aspiration scale, the yam-based lubricant had the most significant benefit ($p = 0.034$) ($r = 0.59$). No significant changes were found in oral transit time and pharyngeal transit time after using lubricants. As for palatability, pasty consistency, Dioscorea spp. yam-based lubricant was the highest-rated option, with an average of 8.54.

Conclusion: Water yam lubricant decreased residue after swallowing, and yam lubricant decreased the penetration and aspiration risk.

Food Lubricants for Patients with Dysphagia: Development and Rheological Properties

Session Title: E-Poster Rating Session F2: Dysphagia Management: Treatments and Care Pathways

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Introduction: Head and neck cancer treatment can have serious consequences, such as hyposalivation and xerostomia, which interfere with bolus transport, impair swallowing, and worsen dysphagia. This study aimed to develop and describe the preparation techniques for two food lubricants and describe their rheological characteristics.

Materials and Methods: The food lubricant preparation included peeling 200 g of yam (Colocasia esculenta) and water yam (Dioscorea alata) and then grating and soaking them separately in 400 ml of filtered water for 48 h under refrigeration. This mixture was then strained, resulting in the final lubricant. The foods were chosen due to their high starch concentration, neutral taste, and similar nutritional composition, and a qualified nutritionist was responsible for the entire procedure. The lubricant samples were analyzed for viscosity and pH level in an environment with a temperature of 17.6 °C. Viscosity was measured with Brabender’s Brookfield DV1+ viscometer, and pH was measured with Gahaca’s Digital PGI1800 pH meter.

Results: As for the lubricants, yam and water yam had, respectively, viscosity of 145.8 with 6a 0.28 pH, and viscosity of 184.0 with 6.25 pH, which is considered neutral and similar to saliva. The lubricant extraction method was both low cost and easy to perform and store.

Conclusion: The methodology provided the extraction of food lubricants based on yam and water yam, which have a high potential to aid the swallowing of patients with dysphagia who have hyposalivation and xerostomia.

Consensus on the Content of an Educational Program for Patients with Oropharyngeal Dysphagia and Their Informal Caregivers: A Delphi Study

Session Title: E-Poster Rating Session F2: Dysphagia Management: Treatments and Care Pathways

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2 Springer
Oropharyngeal dysphagia (OD) has a significant impact on the quality of life of patients and their informal caregivers (ICG). It can negatively influence the psychological and social aspects and lead to multiple complications. Therefore, a multidisciplinary team must intervene by proposing rehabilitation, as well as therapeutic patient education (TPE) allowing patients and ICG to manage this disorder. TPE is an essential component of care and is proven to be effective for many chronic diseases. However, in the absence of literature allowing for an evidence-based approach to TPE in OD, this study aims to reach a consensus on the objectives of an educational program.

The Delphi consensus-building method used, allows reaching an agreement on a subject by questioning experts using iterative questionnaires. In this study, 4 categories of experts have been recruited: patients, ICG, healthcare professionals, and experts in TPE. Based on preliminary studies, the questionnaire comprised 12 themes with 21 educational objectives. It collects the first opinions on the comprehensiveness and relevance by expressing opinions on a 7 point Likert type scale, 1 totally unsuitable, and 7 totally suitable. 3 rounds were carried out; the questionnaire was modified according to the participants' feedback after the first 2 rounds.

The results showed agreement from the 70 participants on 13 themes divided into 23 educational objectives, with a focus on normal swallowing vs. difficulty swallowing, aspiration, signs of OD, consequences of OD, oral hygiene, specific rehabilitation, compensatory strategies, tracheostomy cannula, enteral feeding, communication of health needs, help and support, managing stress, and appropriation of dysphagia.

This Delphi study resulted in a consensus on the content of an educational program for OD patients and their ICG. Further steps are needed to choose the adequate material to present this education content and to verify its acceptability and feasibility.

Characterization of the Epidemiological Profile of Children with Food Refusal and Selectivity.

Session Title: E-Poster Rating Session G1: Pediatrics/Dysphagia Assessment: Screening, Clinical Evaluation, and Instrumental.

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Introduction: Dysphagia prevalence in the pediatric population is growing as the result of health care advances, improving the survival of premature infants and children with severe diseases. Early diagnosis and appropriate evaluation are essential to reduce dysphagia sequelae. Fiberoptic endoscopic evaluation of swallowing (FEES) is an increasingly used procedure for the diagnosis of dysphagia. The advantage of avoiding radiation exposure compared to the videofluoroscopic swallowing study (VFSS) make it a suitable procedure for the pediatric population. The aim of this review was to investigate the state-of-art on the use of FEES in pediatrics.

Materials and Methods: A scoping review of literature was performed on studies performing FEES in patients aged < 18 years. PubMed, EMBASE, Cinhal, and the Cochrane Library databases were searched. Screening of records, full-text analysis, and data extraction were performed by two independent raters. A third rater was involved to resolve disagreements.

Results and Discussion: The electronic search retrieved 6027 records. Fifty-two observational studies were included for a total of 3082 pediatric patients who underwent a FEES examination. FEES could not be performed or completed in only 31 patients. Adverse events are rare and not severe. The procedure is well tolerated, although agitation can be observed during the passage of the fiberscope. FEES was found to show satisfactory inter-rater reliability and good sensitivity and specificity to detect penetration/aspiration and pharyngeal residue, with values comparable to or higher than VFSS. Concordance between FEES and VFSS is high for aspiration, while it reduces for penetration.

Conclusion: FEES is a safe, feasible, accurate, and reliable procedure to diagnose dysphagia in the pediatric population. However, the retrieved studies had a small sample size, lacked of control groups, and did not use standardized FEES protocols, thus, limiting the v.
Validation of the Pediatric Version of the Eating Assessment Tool (Pedi-Eat-10) in Children with Cerebral Palsy Using Rasch Analysis

Session Title: E-Poster Rating Session G1: Pediatrics/Dysphagia Assessment: Screening, Clinical Evaluation, and Instrumental

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Introduction: The purpose of this abstract is to report on the preliminary results of Rasch analysis to validate the Pediatric Version of the Eating Assessment Tool (PEDI-EAT-10) in a sample of children with cerebral palsy (CP). The PEDI-EAT-10 (Demir et al., 2015) is a modified version of the EAT-10 scale for adults developed by Belafsky et al. (2008) and has been shown to be a scale that can identify children with the aspiration risk (AR) with sensitivity = 91.3 and specificity = 98.8 (Serel Arslan et al., 2018).

Materials and Methods: The PEDI-EAT-10 and the Eating and Drinking Ability Classification System (EDACS) were administered to children with CP, between the ages of 24 to 83 months (n = 65). Rasch analysis was applied to establish the validity of the PEDI-EAT-10 including person and item fit, reliability. Separation of persons and items, response scale, dimensionality, floor and ceiling effect were also determined.

Results: The preliminary results includes only subjects in EDACS Levels 1–4 (n = 64). Rasch analysis indicates the PEDI-EAT-10 is a unidimensional measurement tool and has an excellent item separation index, absence of ceiling and floor effect. However, the PEDI-EAT-10 lacks ‘easy items’ and has a person separation index equal to 1.82, which is below the recommended value of 2.0.

The sample (n = 64) used in this analysis lacks subjects with severe AR (EDACS Level V). Additional subjects in EDACS Level 5 are now being collected and it is our plan that the results, with subjects from all EDACS Levels will be presented at the congress.

Conclusions:
1. Preliminary Rasch analysis of the PEDI-EAT-10 indicates this is a unidimensional tool and may be valid to screen children with CP for aspiration risk.
2. Additional subjects in Level 5 EDACS will be added to the analysis to validate the tool on a complete subject sample and, if required, to provide a revision recommendation to improve PEDI-EAT-10 validity (e.g., person separation index).

Correlation Between Bedside and Endoscopic Parameters in Defining Swallowing Disorders in a Cohort of Very Young Children

Session Title: E-Poster Rating Session G1: Pediatrics/Dysphagia Assessment: Screening, Clinical Evaluation, and Instrumental

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Introduction: In our work, we considered a small group of very young children to evaluate a possible correlation between bedside and endoscopic parameters in defining a swallowing disorder.

Materials and Methods: A sample of children within the first year of life, consecutively referred to our Service between 2019 and 2020, were considered. Some parameters of the bedside and endoscopic assessment were taken into consideration. The p-score and the PAS scale were applied.

Eighteen parameters of the bedside assessment were compared with the following instrumental parameters in a bivariate analysis: rhythm alteration of Suction/Swallow/Breathing (SSB), penetration, aspiration, pharyngeal activation delay, spillage, and residue. Subsequently, multivariate associations were made between the instrumental parameters listed above and age, p-score and PAS scale.

Results: Twenty-seven children within the first year of life (range 1–180 days; mean age 57.78 days ± 62.54) were considered. Of these, 11 presented anatomic alterations, 3 genetic pathologies, 2 syndromes (of which 1 Charge), 7 neurological pathologies, 2 systemic pathologies, and 1 congenital heart disease.

Aspiration and pharyngeal activation delay are not correlated with any bedside parameter. Penetration is correlated with oral and mixed feeding. Spillage is correlated with anterior drooling. Residue is correlated with oral feeding, desaturation, gurgling, and supraglottic edema.

Levene’s Test for Equality of Variances shows that age, the p-score, and PAS are non-correlated with SSB alterations and pharyngeal activation delay; the PAS score is correlated with aspiration and penetration; spillage is correlated with the p-score and PAS; residue is correlated with the p-score.

Discussion–Conclusion: These first observations confirm that dysphagia is a multifactorial condition. The evaluation of bedside and instrumental parameters is recommended to better define the physiopathology of dysphagia and the setting-up of a personalized therapeutic plan.

An Enhanced Rapid Review of the Applicability of US in the Assessment of sucking, Swallowing, and Laryngeal Function in the Pediatric Population

Session Title: E-Poster Rating Session G1: Pediatrics/Dysphagia Assessment: Screening, Clinical Evaluation, and Instrumental

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Introduction: The COVID-19 pandemic has renewed interest in the use of ultrasound (US) among dysphagia-trained clinicians working with infants & children. US mitigates the risk of aerosol-generation provoked by other instrumental swallowing assessments. This study aims to determine the applicability of US as an instrumental assessment tool for sucking, swallowing, and laryngeal function in the pediatric population.

Methods: A rapid review of six electronic databases was conducted to identify articles studying the use of US to assess sucking, swallowing, and laryngeal function in the pediatric population.

Results: A modified QUADAS-2 tool was used to assess the quality of studies.
Quantitative Classification of Aspirating Swallow Sounds in Children Using Digital Cervical Auscultation

Session Title: E-Poster Rating Session G2: Pediatrics / Dysphagia Assessment: Screening, Clinical Evaluation, and Instrumental
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Introduction: Use of machine learning to accurately detect aspirating swallowing sounds in children has been reported to have sensitivities between 79 and 89%. This study aimed to investigate the accuracy of using an automatic speaker recognition approach to differentiate between normal and aspirating swallowing sounds recorded from digital cervical auscultation.

Methods: We analyzed 106 normal swallows from 23 healthy children (median 13 months; 52.1% male) and 18 aspirating swallows from 18 children (median 10.5 months; 61.1% male) who underwent concurrent videofluoroscopic swallow studies with digital cervical auscultation. All swallowing sounds were on thin fluids. A support vector machine classifier with a polynomial kernel was trained on spectral subband centroids extracted from each swallowing sound in the training set. The trained support vector machine was then used to classify swallowing sounds in the test set.

Results: We found high accuracy in the differentiation of aspirating and normal swallowing sounds with 98% overall accuracy. Sensitivity for the detection of aspiration and normal swallowing sounds were 89% and 100%, respectively. There were consistent differences in time, power spectral density and spectral subband centroid features between aspirating and normal swallowing sounds in children.

Conclusions: This study provides preliminary research evidence that aspirating and normal swallowing sounds in children can be differentiated accurately using machine learning techniques.
Sequence (nsRS) infants is scarce. This information is critical for improving management. This systematic review (SR) aims to determine the nature, risk factors, and prevalence of feeding and/or swallowing difficulties in nsRS.

Materials and Methods: All published and unpublished studies in English with various study designs and settings were eligible for inclusion. Infants, from all geographical regions, with feeding and/or swallowing difficulties caused by nsRS, without surgery for facial deformities deriving from Robin Sequence (RS) were included. Ten electronic databases were searched from inception to March 2021. Included studies' reference lists and citation indexes, websites, journals and sources on populations were searched. Data extraction and quality assessment (via Infection Prevention and Control Guidelines Critical Appraisal Tool Kit) were performed by two reviewers, and a third negotiator.

Results: From 7763 studies retrieved, four were included (201 participants). Three studies presented findings on feeding and/or swallowing difficulties in 42 nsRS infants. Oral feeding difficulties were sucking–swallowing incoordination, with impaired sucking quality. Swallowing difficulties were predominantly oral phase with some upper esophageal sphincter asynchronous relaxation, abnormal esophageal body motility and lower esophageal sphincter asynchronous/incomplete relaxation. The consequences were reduced fluid intake and penetration–aspiration. Glossopпуск, airway obstruction and cleft palate were risk factors for dysphagia in 133 infants. There was lack of evidence on prevalence. Study quality is graded as low in two studies and moderate in the other two.

Conclusions: NsRS infants have both feeding and swallowing difficulties and RS features are risk factors. Findings provide direction for epidemiological research.

Developing a Core Outcome Set in Oral Stimulation Interventions for Preterm Infants—Step 1: A Scoping Review of Current Trial Outcomes

Session Title: E-Poster Rating Session G2: Pediatrics/Dysphagia Assessment: Screening, Clinical Evaluation, and Instrumental

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Introduction: Core outcome sets (COS) support combining and comparing research findings from clinical trials facilitating meta-analyses and reducing research waste. One area which requires a COS is oral stimulation interventions (OSI) in neonates. Evidence suggests that OSI might support preterm infants in attaining earlier oral feeding, but meta-analyses are difficult as outcomes vary across studies. Standardization of outcomes and their measurement would facilitate systematic reviews/meta-analyses and promote evidence-based practice. Aim: The aim of the study was to conduct a scoping review (ScR) to examine outcomes already used in OSI trials as the first stage in COS development.

Methods: Using Joanna Briggs Institute methodology, a ScR was conducted. Included studies were randomized controlled trials in OSI identified through search as part of an updated Cochrane Review in OSI. Outcomes used in studies were charted and classified using a specific taxonomy by Dodd et al. Additional relevant information were collated into an Excel spreadsheet. Descriptive statistics including frequency counts were used for data analysis.

Results: Thirty-four articles (1781 participants) were included and 180 outcomes were classified. Most outcomes (44.44%) were physiological, while 33.33% were resource related. 18.89% of outcomes investigated adverse events of OSI and 3.33% investigated life impact-related outcomes. No outcome investigated mortality or death. Outcome definitions, methods, time points/frequencies of measurement varied across studies.

Discussion/Conclusion: The wide range of outcomes, variability in definitions and measurement methods support the development of a COS to address the inconsistencies in outcome measurement within this clinical field. There was a notable gap between the amount of physiological vs. life impact related outcomes. Implications for RCT design are discussed.

UK Speech and Language Therapists Working in School-Aged Children Dysphagia Practice. Impact of Covid-19 on Clinical Practice: A Survey

Session Title: E-Poster Rating Session G2: Pediatrics/Dysphagia Assessment: Screening, Clinical Evaluation, and Instrumental

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Introduction: The Covid-19 pandemic has impacted the clinical practice of UK Health Care Professionals. This abstract presents the impact on Speech & Language Therapists (SLTs) working with school-aged children with neurodizability and dysphagia, requiring mealtime assistance.

Methods: A survey exploring UK SLT clinical practice was developed utilizing the research literature, recent relevant surveys and in consultation with an SLT advisory team and stakeholders. The final survey was piloted with 8 SLTs, and formal ethical approval received. It comprised 36 questions, focusing on demographic and caseload information, typical assessment and intervention practice and Covid-19 adaptations (5 questions). Questions were a mixture of multiple choice and free text responses. The survey was disseminated using professional networks and social media, between May 14th and July 30th, 2021. Full data analysis is ongoing.

Results: Preliminary data analysis indicates over 90 SLT participants completed the survey’s Covid-19 impact questions. Participants worked across all regions of the UK, were employed in different sectors (NHS, education, independent) and worked in acute, school and community settings. The vast majority agreed that Covid-19 had impacted their dysphagia management of school-aged children. Factors reported to have had a negative impact on practice included: reduced home visiting, suboptimal family and professional telehealth access and skills, face mask use. Positive impacts included: professionals’ improved telehealth access and skills, increased focus on home vs. school meals, carers’ improved technology skills. Many SLTs identified a desire to take changes into future practice, including telehealth.

Conclusions: This work will describe the impact of the Covid-19 pandemic on UK SLTs’ dysphagia practice with school-aged children. Positive changes identified included a will to maintain telehealth access and skills.
Optimizing the Oral Intake Experience Among Individuals with Chronic Obstructive Pulmonary Disease via a Breathing-Based Meditation Program

Session Title: E-Poster Rating Session H1: Dysphagia Management: Treatments and Care Pathways
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Introduction: Chronic obstructive pulmonary disease (COPD) presents physiologically via dyspnea and coughing during oral intake. These symptoms lead to psycho-emotional reactions like fear and anxiety, which further impact the physiological symptoms. Given the substantial impact COPD has on oral intake that stems from both the physiologic and psycho-emotional components of the disease, comprehensive treatment is needed. The goal of this study was to investigate the feasibility and acceptability of an evidence-based, breathing-based meditation program, Sudarshan Kriya Yoga (SKY), for individuals with COPD.

Methods: Nine participants with COPD (age 30–75 years; 4 females) participated in SKY training. Upon treatment completion, individual semi-structured interviews were completed guided by phenomenology. Open-ended questions targeted participants’ perceptions related to their experience with SKY and its impact on oral intake.

Results: Results indicated that SKY can play a positive role in improving the oral intake experience. Emerging themes centered around three main concepts and their interrelatedness: mind, body, and breath. Participants’ descriptions also revealed that SKY helps disrupt the anxiety-dyspnea-anxiety cycle. For example, one participant shared, “[SKY] could teach you to be able to relax a little bit better. When you’re feeling shortness of breath coming on- it kind of builds up on itself so if you’re able to relax a little bit and to breathe more- more deeply and all. That can help tap all that down.”

Discussion: This study suggests that breathing-based meditation is acceptable and feasible for individuals with COPD and can yield an improved eating experience. This work lays the foundation for better understanding the utility of a holistic approach to mitigate the psychophysiological factors influencing oral intake, ultimately disrupting the cyclical influences of these secondary sequelae and improving quality of life for individuals with COPD.

Development of Interdisciplinary Suctioning Competencies for Speech and Language Therapists in the Management of Patients with Tracheostomy

Session Title: E-Poster Rating Session H1: Dysphagia Management: Treatments and Care Pathways
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Introduction: Speech & Language Therapists (SLTs) are valuable members of the Tracheostomy multidisciplinary team. It is within the extended scope of practice for SLTs to complete tracheostomy suctioning on patients with tracheostomy. To date, there was no local SLT tracheostomy suction competency program established. Physiotherapists are trained in tracheal suctioning technique and regularly use suctioning in the management of patients with tracheostomy. Cardiorespiratory-physiotherapists are involved in the training of staff and students in suctioning. Given the already defined pathway for education and the well-established interdisciplinary working relationship between physiotherapists and SLTs, this collaborative project was undertaken.

Methods: A retrospective review of current suction competencies and practices was completed. A new policy, with a competency program, was developed. This included self-directed reading, a theoretical tutorial, practical implementation of skills on mannequin, and supervised suction of 5 adult tracheostomy inpatients. Established competencies were signed off by Senior or Clinical Specialist Cardiorespiratory Physiotherapist. The decision to identify appropriate candidates within SLT was made by Clinical Specialist SLT.

Results: The successful implementation of a competency program and policy introduced to facilitate the training of SLTs, in the extended scope of practice of tracheal suctioning, was developed as a part of this project. The expansion of this skillset is assisting in the management of patients with a tracheostomy.

Discussion/Conclusion: It is within extended scope of practice for SLT to complete tracheal suction in patients with tracheostomy. The development and implementation of a structured competency program ensured that all competencies were met. Maintenance of skills will be ensured by regular practice as per local policy. Future recommendation is for a national SLT Tracheostomy Suction competency program.

A Safe Way to Administer Drugs Through a Nutrition Tube: The Simple Suspension Method

Session Title: E-Poster Rating Session H1: Dysphagia Management: Treatments and Care Pathways
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Introduction: The simple suspension method (SSM), developed by Kurata in 1997, is a safe way to suspend tablets and capsules in warm water for decay and suspension prior to their administration. This method has many advantages such as avoidance of tube clogging, drug loss, reduction of the burden of crushing drugs, avoidance of economic loss, and improvement of patient’s quality of life by using thinner tubes. This study aimed to investigate whether a higher percentage of commonly used drugs could pass through nutrition tubes effectively using SSM, relative to that using the conventional crushing method.

Methods: A tablet or capsule was inserted into a 20 mL syringe with warm water (at 55 °C). After 10 min, it was shaken in the syringe. The suspension liquid was injected into tubes of the following sizes: 8 Fr, 10 Fr, 12 Fr, 14 Fr, 16 Fr, and 18 Fr. A total of 6386 drugs that are frequently used in Japan were tested.

Results: Using SSM, 5880 drugs (92.1%) disintegrated within 10 min and passed through the tube without clogging it in the tube passage test. With the conventional crushing method, 5340 drugs (83.6%) could be crushed.

Conclusions: SSM reduces the risk of tube blockage and drug loss with a large number of drugs compared with the conventional crushing method. Further studies are required to evaluate its utility compared to conventional methods for dysphagia patients in clinical settings.
Training Dysphagia in Post-COVID Patients: Results of a Simple Intervention Based on Respiratory Muscle Training and Neuromuscular Stimulation

Session Title: E-Poster Rating Session H1: Dysphagia Management: Treatments and Care Pathways

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Introduction: Dysphagia after Covid is a new and emerging condition which has presented a challenge when trying to determine the best practice standards of treatment based on the current evidence. New protocols need to be developed to face swallowing disability. Materials and Methods: To examine the efficacy of 3-week combined program based on inspiratory and expiratory respiratory muscle training (IEMT) and Neurosmuscular Stimulation with respect to the swallowing function in dysphagic post-COVID patients admitted to rehabilitation department in a tertiary hospital for improving function after suffering from critical illness myopathy. Participants: Cohort included 23 subjects presenting dysphagia after suffering COVID infection. Intervention: Patients followed a 3-week rehabilitation program of IEMT and NMES. Techniques were applied one or both depending on VFSS findings. All therapies were provided and supervised by experimented SLP, who also facilitated specific exercises depending on efficacy or security disturbances detected on VFSS. Main outcome measures were as follows: MIP, MEP, peak cough flow, and Functional Oral Intake Scale (FOIS) measures.

Results: Mean age 62.9 (SD8.83), Mean days in ICU 39.7 (SD 57.2), mean days with tracheostomy 31.42 (SD20.9), mean days in Rehabilitation Dept 19.5 (SD11.45), mean days total income 82.66 (SD36.13).

All selected parameters obtained a significant improvement at the end of training period. Full diet was achieved for 77.7% of the sample, only 50% at income.

Conclusions: 3-week combined inspiratory and expiratory RMT and NMES protocol is feasible as therapy for dysphagia in post-COVID patients in a short period of time, improving all parameters evaluated and confirming an important role of the peripheral muscle wasting in swallow function after COVID. It also provides a novel training scheme for treating it.

The Quality of Life in Citizens with Oropharyngeal Dysphagia—A Cross-Sectional Study

Session Title: E-Poster Rating Session H2: Dysphagia Management: Treatments and Care Pathways

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Introduction: Dysphagia is one of the multiple risk factors that impair an individual’s experience of mealtimes. A limited number of studies have been carried out to contribute knowledge on the quality of life (QoL) of citizens with oropharyngeal dysphagia (OD) who live independently. The aim of this study was to evaluate the health-related quality of life (HRQL) in citizens with OD living independently.

Method: This cross-sectional study was performed in seven municipalities in Denmark between March 2019 and December 2020. The 90 citizens included [54% female, mean age 76.6 years (SD 0.8)] were ≥18 years, diagnosed with OD using the Volume-Viscosity Swallow Test and Minimal Eating Observation Form version II. They also had to be able to understand the questionnaires: The Dysphagia Handicap Index-DK, Barthel 20, and European Quality of Life—5 Dimensions.

Results: A total of 66% of the participants reported needing more time to eat, 64% coughed while eating, and 58% while drinking. Additionally, 60% reported having a dry mouth, 62% said they needed to drink to succeed with swallowing foods, and 57% reported that they had to swallow multiple times. About one third of participants reported feeling embarrassed when eating with others and felt sad about not being able to eat everything. Also, they could not enjoy eating as they used to, and/or felt handicapped or limited.

Conclusion: OD had a high impact on the QoL in citizens with OD living independently. Focus is needed on xerostomia as well as on the psychological areas surrounding mealtimes for citizens with OD.
Impact of Dental Treatment and Management on Patients with Oral Hypofunction

Session Title: E-Poster Rating Session H2: Dysphagia
Management: Treatments and Care Pathways

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Introduction: Decline in oral function may affect subsequent physical frailty in the older population. The Japanese Society of Gerodontology defined oral hypofunction as a stage in which people can recover function by performing appropriate dental intervention before actual oral dysfunction occurs. This study reports the summarized data of the patients who underwent the oral functional examination and impact of dental treatment and management on the patients with oral hypofunction.

Method: Older dental outpatients over 65 years old at the Niigata university hospital received detailed assessment of seven oral function items for diagnose of oral hypofunction; oral hygiene, oral dryness, occlusal force, motor function of tongue and lips, tongue pressure, masticatory function, and swallowing function. Oral hypofunction was diagnosed if results of three or more of seven assessment items were below cutoff values. Patients with oral hypofunction received a management for deteriorated function or dental treatment. They were re-evaluated six months after the first assessment. We compared the results of the first and second assessment.

Result: Of a total of 213 patients who underwent the first assessment, 72 patients were diagnosed with oral hypofunction and received dental treatment and management. As 41 patients had finished dental treatment within 6 months or declined a management of oral hypofunction, 31 patients with oral hypofunction were eventually completed the second assessment. Comparing the first and second assessment, significant improvement in the values of poor oral hygiene, occlusal force, motor function of tongue and lips, masticatory function, and swallowing function. Of the 26 patients who improved the value of occlusal force, 22 (84.6%) were received the prosthetic treatments.

Conclusion: We suggest that dental treatment and management for patients with oral hypofunction can contribute to the improvement of deteriorated oral functions.

Therapeutic Eating: Benefits of Including a Structured Eating Plan in a Speech and Language Therapy Radiotherapy Head and Neck Cancer Clinic

Session Title: E-Poster Rating Session H2: Dysphagia
Management: Treatments and Care Pathways.

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Galway University Hospital

Introduction: Dysphagia during and after chemoradiotherapy for head and neck cancer is common (1). Severity of symptoms can range from minor swallow problems to complete dependence on tube feeding (2). In addition, dysphagia secondary to chemoradiation negatively impacts social eating in public (3) and quality of life (4). Evidence supports that maintaining some degree of oral intake and swallowing exercise adherence results in better long-term swallowing outcomes (5). To translate this evidence to clinical practice, we introduced a ‘structured eating plan’ in addition to traditional SLT care.

Materials and Methods: The patient was instructed to eat a snack size volume of one ‘level’ above their Normalcy of diet PSS-HN score (3) 4 times per day, targeting 80 swallows daily (7). This Structured eating plan was trialed with 5 patients (T1) with squamous cell carcinoma of the tonsil, receiving traditional chemoradiotherapy. They also received traditional SLT treatment. Outcome measures consisted of the Functional Oral Intake Scale-FOIS (8) and the Performance Status for Head and Neck Cancer Patients-PSS-HN (3). These measures were taken at baseline and at day of completion of chemoradiotherapy. A retrospective review was performed on 5 patients who received SLT traditional care prior to the introduction of this structured eating plan. These patients (T2) were matched with T1 in terms of age, gender, diagnosis and treatment type. Results of FOIS and PSS-HN were compared between T1 and T2.

Results: All participants maintained some degree of oral intake throughout the Radiotherapy treatment. However, at day of treatment Completion, the scores on the FOIS and PSS-HN for T2 group were consistently higher than T1 group.

Conclusions: We demonstrated that functional oral intake and swallow-related quality of life can be improved through the addition of a structured eating plan to traditional SLT care in Chemoradiotherapy for Head and Neck Cancer. Further research is required.

Dysphagia After Stroke in ICU Patients

Session Title: E-Poster Rating Session H2: Dysphagia
Management: Treatments and Care Pathways

Soultana Papadopoulou, S1; Maria Vagia, M2
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Introduction: Dysphagia is common in stroke patients and may provoke severe complications, such as malnutrition, dehydration, aspiration pneumonia leading to prolonged hospital stay, and increased mortality. Materials and Methods: The aim of our study was to investigate the presence and characteristics of dysphagia in patients with stroke admitted to the ICU of the University Hospital of Ioannina even upon exit from the ICU. We investigated any correlations between the presence and severity of dysphagia and possible risk factors, in order to improve clinical complications in these patients. This retrospective analysis included 74 stroke patients admitted to the ICU during the last 2 years. Demographics and clinical characteristics were obtained from the medical records, family members or from the patients when it was feasible. We also recorded data of any evaluation (using the Ohkuma Questionnaire) or treatment of dysphagia that took place during their hospitalization after ICU exit and after discharge. Statistical analysis was performed using SPSS® ver25.

Results: A total of 74 patients (26 women and 48 men, mean age 66.3 years) were included in the analysis. Prolonged intubation, mechanical ventilation, and hospitalization were independent risk factors for the development of dysphagia. The presence of dysphagia was also statistically associated with the type of stroke, the damage hemisphere, and the diameter of the endotracheal tube.

Speech therapy sessions during hospital stay, mainly the next months after discharge, were significantly correlated with a better score in the Ohkuma Questionnaire. Finally, in the majority of the patients (80%) the carers were family members or others who were not professionals.

Conclusions: Dysphagia as a result of stroke seems to affect a significant number of critically ill stroke patients even after hospital exit. Thus intervention strategy performed by a multidisciplinary team may lead to early treatment of dysphagia.
Conclusion: PES improves severe dysphagia in recently extubated stroke patients, resulting in reduced risk of pneumonia, less tube dependency, earlier oral nutrition, and shorter length of stay. Extubation failure rate may also be reduced.

Introduction: Post-extubation dysphagia (PED) is a relevant risk factor for extubation failure in acute stroke patients requiring intensive care treatment. Need for reintubation is associated with negative sequelae such as pneumonia, prolonged treatment and increased morbidity. Pharyngeal electrical stimulation (PES) is a neurostimulation technique to support dysphagia rehabilitation after stroke. We evaluated whether PES can enhance recovery of PED compared to sham treatment.

Patients and Methods: A randomized controlled trial was conducted on our neurological ICU. 60 extubated acute stroke patients, who showed severe dysphagia in FEES, defined as Fiberoptic Endoscopic Dysphagia Severity Score (FEDSS) > 4, were consecutively recruited. Participants were randomized within 4 h after extubation to receive either real or sham PES. Treatment started directly thereafter and was performed once daily for 10 min on three consecutive days in addition to standard care.

Results: Baseline stroke and dysphagia characteristics did not differ between groups. The PES group showed significantly greater improvement of swallowing function after three days compared to sham (FEDSS 3.3 vs. 4.3 pts, \( p < 0.0005 \)). Consequently, reintubation rate within 120 h from extubation was 13% vs. 33\% (\( p = 0.067 \)) with a pneumonia rate of 60 vs. 83\% (\( p = 0.045 \)). After PES, 73\% were able to consume a completely oral diet in the further course, compared to 47\% after sham intervention. Time until totally oral nutrition was 4.3 vs. 10.2 days (\( p = 0.001 \)). In the sham group, 53\% were tube dependent at discharge whereas this was only the case in 27\% of the PES group. Length of stay after study inclusion was significantly shorter after PES (13.8 vs. 21.9 days, \( p = 0.004 \)).

Conclusion: PES improves severe dysphagia in recently extubated stroke patients, resulting in reduced risk of pneumonia, less tube dependency, earlier oral nutrition, and shorter length of stay. Extubation failure rate may also be reduced.

Dysphagia Therapy in the Geriatric Hospitalized Patients

Abstract

Etiology, Pathophysiology, and Clinical Trials

S89

Session Title: Free Paper Session 1: Neurogenic Dysphagia: Etiology, Pathophysiology, and Clinical Trials

Suntrup-Krueger, S1; Muhle, P1; Labeit, B1; Marian, T1; Schroeder, J1; Claus, I1; Ahring, S1; Warnecke, T1; Dziewas, R2

1Department of Neurology, University Hospital Muenster; 2Department of Neurology, Klinikum Osnabrück

Introduction: Swallowing is a well-coordinated function which aging can affect its efficacy and safety. Studies reported that the prevalence of dysphagia in elders will increase to 37–78\% if the people suffer from other conditions such as stroke. Scientists suggested to early intervention of dysphagia to prevent the complications of dysphagia. Behavioral therapy is the popular treatment methodology but there are debates on the effectiveness of it. Therefore, supplementary treatments such as transcranial Direct Current Stimulation (tDCS) are suggested to improve the effectiveness of the treatments. This study aimed to investigate the effectiveness of an online tDCS protocol for elderly patients post-stroke who suffer from dysphagia.

Materials and Methods: Fourteen patients (≥ 65 y/o) who were hospitalized due to stroke were randomized into two groups (behavioral therapy + Sham tDCS and behavioral therapy + Real tDCS). All the patients underwent 5 sessions of therapy for 20 min. Real group received 2 mA anodal stimulation on the area of CP5 or CP6 (the supermarginal gyrus) of the intact hemisphere. All the patients were evaluated by MASA and FOIS before and after the treatment.

Results: There was no significant difference at the baseline between groups. According to MASA and FOIS, swallowing ability and function of all the patients improved after therapy (\( p = 0.000 \), \( p = 0.002 \), respectively). The mean score of MASA was significantly higher in the real group compared to the sham group. All the patients in the real group gained at least 2 points of improvement in FOIS while in the sham group, only 2 patients had such an improvement (Table 1).

Conclusions: Supramarginal gyrus is a part of somatosensory association cortex which plays a key role in proprioception. Studies in the stroke patients showed that this region can play a role in coordination of swallowing. According to our results, stimulating this region may be a beneficial option for dysphagia recovery.

Variables | Sham Group (N = 8) | Real Group (N = 6) | P-value
--- | --- | --- | ---
Age | 81.375 (7.927) | 75.500 (6.834) | 0.172
Day post-stroke study inclusion | 3.750 (2.188) | 3.833 (1.835) | 0.639
NIH-SS score | 18.750 (6.519) | 17.667 (3.670) | 0.722
Sex (Female) | 4 (50\%) | 3 (50\%) | –
Previous stroke (Yes) | 3 (37.5\%) | 3 (50\%) | –
Side of stroke (Right) | 4 (50\%) | 3 (30\%) | –
MASA Score base | 106.625 (30.175) | 111.667 (39.823) | 0.791
MASA Score post-treatment | 126.500 (35.108) | 166.000 (24.240) | 0.036
FOIS base | 1.750 (1.035) | 2.000 (1.550) | 0.762
FOIS post-treatment | 2.500 (1.852) | 4.668 (1.862) | 0.049

Dysphagia Therapy in the Geriatric Hospitalized Patients

Session Title: Free Paper Session 1: Neurogenic Dysphagia: Etiology, Pathophysiology, and Clinical Trials

Farbourn, S1; Asady Shekary, M1; Borhani Haghighi, A2; Farbourn, H2

1Kerman Neuroscience Research Center, Institute of Neuropharmacology, Kerman University of Medical Sciences, Kerman, Iran; 2Shiraz University of Medical Sciences, Shiraz, Iran

Introduction: Swallowing is a well-coordinated function which aging can affect its efficacy and safety. Studies reported that the prevalence of dysphagia in elders will increase to 37–78\% if the people suffer from other conditions such as stroke. Scientists suggested to early intervention of dysphagia to prevent the complications of dysphagia. Behavioral therapy is the popular treatment methodology but there are debates on the effectiveness of it. Therefore, supplementary treatments such as transcranial Direct Current Stimulation (tDCS) are suggested to improve the effectiveness of the treatments. This study aimed to investigate the effectiveness of an online tDCS protocol for elderly patients post-stroke who suffer from dysphagia.

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Conclusions: Supramarginal gyrus is a part of somatosensory association cortex which plays a key role in proprioception. Studies in the stroke patients showed that this region can play a role in coordination of swallowing. According to our results, stimulating this region may be a beneficial option for dysphagia recovery.

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Oral Phase Efficiency and Swallowing Safety During Meals are Associated with Malnutrition Risk in Patients with Neurodegenerative Diseases

Session Title: Free Paper Session 1: Neurogenic Dysphagia: Etiology, Pathophysiology, and Clinical Trials

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Conclusion: Supramarginal gyrus is a part of somatosensory association cortex which plays a key role in proprioception. Studies in the stroke patients showed that this region can play a role in coordination of swallowing. According to our results, stimulating this region may be a beneficial option for dysphagia recovery.
Introduction: Malnutrition is common among patients with neurodegenerative diseases and has a multifactorial origin. Oropharyngeal dysphagia (OD) is generally recognized to increase the risk of malnutrition; however, its role in patients with neurodegenerative disease has been little investigated. This cross-sectional study aimed to analyze the impact of oropharyngeal dysphagia (OD) on nutritional risk in patients with neurodegenerative diseases.

Materials and Methods: Patients with oral nutrition and diagnosis of Huntington’s disease (HD), Parkinson’s disease (PD), or Amyotrophic Lateral Sclerosis (ALS) were recruited. The swallowing assessment included a fiberoptic endoscopic evaluation of swallowing, an oral phase assessment using the Test of Masticating and Swallowing Solids (TOMASS), and a meal observation scored with the Mealtime Assessment Scale (MAS). Nutritional status was assessed with the Mini Nutritional Assessment (MNA®). Patients with a MNA® < 24 were considered at risk of malnutrition.

Results and Discussion: One hundred and forty-eight (148) patients were recruited (54 HD, 33 PD, and 61 ALS). One hundred (67.6%) patients were considered at risk of malnutrition. At the multivariate analysis, age ≥ 65 (OR 3.16, p = 0.014), disease severity (moderate vs mild OR 3.89; severe vs mild OR 9.71; p = 0.003), number of masticatory cycles at TOMASS (OR 1.03, p = 0.044), and MAS safety (OR 1.44, p = 0.016) were significantly associated with the risk of malnutrition. No significant association was found for FEES findings.

Conclusion: An increased number of masticatory cycles and signs of impaired swallowing safety during meals, together with older age and greater disease severity, are independent predictors of malnutrition risk in three neurodegenerative diseases (HD, PD, ALS). Therefore, a multidimensional swallow assessment is advisable to appraise nutritional impact of dysphagia in this population.

Swallowing Activation with Flavors in Severe Disorders of Consciousness

Session Title: Free Paper Session 1: Neurogenic Dysphagia: Etiology, Pathophysiology, and Clinical Trials

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Rouen University Hospital

Swallowing disorders and oropharyngeal dysphagia are systematically present in patients suffering from severe brain injury and disorders of consciousness. Our hypothesis was that taste and smell could stimulate swallowing function in these patients.

To respond to this question, eight patients with a minimally conscious state were included in this study. They were all in a stable state from two years and the delay between the neurological event and the study was always more than two years. Olfactory and taste stimuli were performed using the Pfister classification and strong odors were selected. Smell and taste stimulations were performed every day a week for one week (five sessions). Before the first session and after the fifth session, swallowing was clinically assessed by counting the number of spontaneous swallows over a period of ten minutes, assessing the presence of drooling, spontaneous tongue mobility and velum mobility.

The number of spontaneous swallows at the initial assessment was 6.8 ± 5.1 n min⁻¹. At the end last session, there was a significant increase in the number of spontaneous swallows (9.1 ± 4.1 n min⁻¹, p < 0.01).

This simple clinical case study showed that taste and smell stimulations increased the number of spontaneous swallowing.

Sensorimotor Training for Airway Protection (SMTAP) Versus Expiratory Muscle Strength Training (EMST) to Rehabilitate Cough and Swallowing in Parkinson’s Disease: A Clinical Trial

Session Title: Free Paper Session 1: Neurogenic Dysphagia: Etiology, Pathophysiology, and Clinical Trials

Troche, M¹; Curtis, J¹; Dakin, A¹; Sevitz, J¹; Borders, J¹; Perry, S¹; Vanegas-Arroyave, N²; Hegland, K³
¹Teachers College, Columbia University; ²Baylor College of Medicine; ³University of Florida

Introduction: Disorders of airway protection (cough and swallowing) are pervasive and degenerative in Parkinson’s disease (PD) resulting in a high incidence of aspiration-related lung infections. Deficits of airway protection are multifactorial in PD and include reductions in the perception of cough stimuli, higher cough thresholds, disordered voluntary control of cough, and peripheral respiratory muscle weakness—all of which are known to be more impaired in patients with dysphagia. The goal of this study was to compare two distinct rehabilitation paradigms, Expiratory Muscle Strength Training (EMST) and sensorimotor training for airway protection (smTAP), to improve airway protective outcomes in people with PD and dysphagia.

Methods: Seventy-five participants with PD were recruited into this prospective phase II randomized-blinded clinical trial comparing EMST vs. smTAP. All participants completed a baseline assessment, five weeks of training including weekly meetings with a clinician and four days of home practice, and a post-training assessment. Mixed effects models were used to assess between- and within-subject effects of EMST and smTAP on patient-centered and sensorimotor cough and swallowing outcomes.

Results: Sixty-five participants were randomized to receive EMST or smTAP. There were no adverse events. Both EMST and smTAP resulted in significant improvements to maximal expiratory pressure and voluntary cough peak expiratory flow rate (PEFR). Moreover, the smTAP group also demonstrated improvements in sensory and motor aspects of reflex cough with higher PEFR and changes in urge-to-cough sensitivity slopes. No significant changes in swallowing or patient-centered outcomes were observed.

Conclusions: This clinical trial confirmed the safety and efficacy of a sensorimotor approach to cough skill training (smTAP) to improve motor and sensory aspects of cough, above and beyond the changes seen with EMST, the current gold standard for treatment of airway protection in PD.

Pharyngeal Electrical Stimulation Prior to Extubation may Reduce the Risk of Extubation Failure in Mechanically Ventilated Stroke Patients at High Risk of Severe Dysphagia

Session Title: Free Paper Session 1: Neurogenic Dysphagia: Etiology, Pathophysiology, and Clinical Trials

Muhle, P¹; Labeit, B¹; Claus, I¹; Roderigo, M¹; Warnecke, T¹; Dzwias, R²; Suntrup-Krueger, S³
¹University Hospital Muenster, Department of Neurology; ²Klinikum Osnabrück, Department of Neurology; ³Department of Neurology, University Hospital Muenster

Introduction: Post-extubation dysphagia has become a growing concern as a major risk factor for extubation failure (EF) and contributes significantly to a poor patient outcome. Timely extubation...
after ventilator weaning is desirable to reduce ventilator-associated pneumonia, need for tracheostomy, length of stay (LOS) in the ICU, and mortality. However, EF and consequently the need for reintubation are associated with similar sequelae. Pharyngeal electrical stimulation (PES) is a neurostimulation device to improve airway safety and dysphagia rehabilitation in stroke patients. Here, we evaluated whether PES prior to extubation can reduce the risk for EF in orally intubated stroke patients at high risk of severe dysphagia.

**Patients and Methods:** Thirty-two orally intubated, mechanically ventilated stroke patients in our neurological ICU with a high risk for dysphagia (Determine Extubation Failure In Severe Stroke risk score ≥ 4) were prospectively included. PES was applied for 10 min daily on 3 consecutive days prior to extubation. Swallowing function was evaluated using the Fiberoptic Endoscopic Dysphagia Severity Score (FEDSS) within 24 h after extubation. For comparison, a retrospective patient control group (n = 32) was matched for age, gender, supra-/infratentorial lesion location, stroke severity (NIH-SS) and DEFISS risk score prior to extubation.

**Results:** Time of mechanical ventilation did not differ between groups. The FEDSS and reintubation rates after extubation were lower in the PES group (4.3 ± 1.5 vs. 5.0 ± 1.3; p = 0.047; 9.4% vs. 34.4%; p = 0.032). Pulmonary infection following extubation was less frequent, yet not statistically significant. LOS after study inclusion compared to extubation in the control group was significantly shorter after PES (17.8 ± 12.0 vs. 16.6 ± 20.5; p = 0.004).

**Conclusions:** PES may improve severe dysphagia and decrease the risk for EF in orally intubated, mechanically ventilated stroke patients at high risk of severe dysphagia. PES may reduce LOS following extubation.

**A Systematic Review and Meta-analysis on the Efficacy of Pharmacological Agents for Neurogenic Oropharyngeal Dysphagia**

**Session Title:** Free Paper Session 2: Systematic Reviews and Meta-Analyses

**Cheng, I; Sasegbon, A; Hamdy, S**

GI Sciences, Division of Diabetes, Endocrinology and Gastroenterology, School of Medical Sciences, University of Manchester

**Introduction:** There are limited data on the efficacy of pharmacological agents for neurogenic oropharyngeal dysphagia. Therefore, we aimed to systematically review and analyze the effects of these agents on swallowing outcomes, based on evidence from randomized controlled trials (RCTs).

**Methods:** Electronic databases were systematically searched between January 1970 and March 2021. Data were extracted and synthesized independently by two reviewers. The outcome measure was changes in (any) relevant clinical swallowing-related characteristic.

**Results:** A total of 14 RCT studies across a range of pharmacotherapies with data from 2186 dysphagic patients were included in the meta-analysis. The pooled effect size of transient receptor potential (TRP) channel agonists was large compared to placebo interventions (SMD [95%CI] = 1.27 [0.74, 1.80]; p < 0.001; I² = 79%). Other pharmacological agents had limited data and the overall pooled effect size of these agents was non-significant (SMD [95%CI] = 0.25 [−0.24, 0.73]; p = 0.31; I² = 85%). When analyzed separately, large effect sizes were observed with Nifedipine (SMD [95%CI] = 1.13 [0.09, 2.18]; p = 0.03) and Metoclopramide (SMD [95%CI] = 1.68 [1.08, 2.27]; p < 0.001). By contrast, the effects of angiotensin converting enzyme (ACE) inhibitors (SMD [95%CI] = −0.67 [−2.32, 0.99]; p = 0.43; I² = 61%), Physostigmine (SMD [95%CI] = −0.05 [−1.03, 0.93]; p = 0.92) and Glyceryl Trinitrate (GTN) (SMD [95%CI] = −0.01 [−0.11, 0.08]; p = 0.78) were non-significant. Within stroke patients, subgroup analysis showed that TRP channel agonists had a moderate pooled effect size (SMD [95%CI] = 0.74 [0.10, 1.39]; p = 0.02; I² = 82%) whereas the effects of other agents were non-significant (SMD [95%CI] = 0.40 [−0.04, 0.84]; p = 0.07; I² = 87%).

**Conclusions:** Our results showed that TRP channel agonists, Nifedipine and Metoclopramide may be beneficial for neurogenic dysphagic patients. Large scale, multicenter clinical trials are warranted to fully explore their therapeutic effects on swallowing.

**The Psychological Impact of Covid-19 on Speech and Language Therapists Working with Dysphagia: An Italian Perspective**

**Session Title:** Free Paper Session 2: Systematic Reviews and Meta-Analyses

**Caselli, A; Regan, J**

Trinity College Dublin

**Background and Aims:** In Europe, Italy was the first and hardest hit country by the COVID-19 pandemic, with heavy repercussions on the public health care system and on the wellbeing of its healthcare professionals. This study aimed to explore the psychological impact of the COVID-19 pandemic on speech and language therapists (SLTs) working with dysphagia in Italy and to study factors associated with psychological distress. It also aimed to explore perspectives of Italian SLTs in regards to their personal experience during the pandemic.

**Materials and Methods:** An online cross-sectional survey was developed which included the Depression Anxiety Stress Scale-21 (DASS-21) and the Impact of Events Scale-Revised (IES-R). The survey was distributed to SLTs working with dysphagia during the pandemic in Italy. Descriptive and inferential statistics analyses were used to analyze the data. Reflexive thematic analysis was used to analyze SLT perspectives on experiences during the pandemic.

**Results:** One hundred and seventeen (117) surveys were collected and 68 were eligible for analysis. Overall, 42.6% participants presented with stress, 33.8% with anxiety, 26.5% with depression, and 22.5% with post-traumatic stress disorder. A statistically significant relationship was found between the independent variable not living with medically vulnerable individuals and the absence of psychological distress. Younger (21 to 30 years) and less experienced (0 to 10 years) SLTs were most psychologically impacted by the pandemic. Major themes identified by the reflexive thematic analysis included fear of infection, unavailability of PPE and feeling lack of guidance. Positive themes included support from family/friends and colleagues, solidarity between colleagues, acquisition of new abilities.

**Conclusions:** The psychological burden experienced by SLTs working with dysphagia during COVID-19 in Italy was significant. Findings should assist managers to identify and support SLTs most likely to present with psychological distress.

**A Cross-Sectional Analysis of Systematic Review Quality in the Swallowing Sciences: How do We Measure Up?**

**Session Title:** Free Paper Session 2: Systematic Reviews and Meta-Analyses

**Skoretz, S; Schreiber, A; Jones, R**

Springer
Introduction: Our aim as researchers and clinicians is to enhance patient outcomes through rigorous methodology and evidence-based practice. For guidance, we look to the highest levels of evidence: systematic reviews (SRs) and overviews of SRs (meta-meta-analyses). Our objective was to conduct quality assessment of systematic reviews (SRs) in the area of swallowing sciences.

Materials and Methods: Using overview methodology1,2 to identify SRs, we searched 8 databases (including grey literature) and conducted citation chasing. Two independent reviewers used a priori criteria to screen abstracts and then full texts. We included SRs with: adults (≥ 17 years), swallowing outcomes and availability in English. Two reviewers blinded to each other performed the AMSTAR-23 on a randomly selected SR subset (~ 20%). AMSTAR-2 is a validated, 16 domain quality assessment tool for SRs with 7 critical domains. Disagreements at all levels were resolved by consensus with the results summarized narratively.

Results: We identified 5325 citations with 214 SRs meeting inclusion. Fifty-three SRs were randomly selected for quality assessment. Of these, 14 (26%) conducted a meta-analysis. Across the SR sample, the quality ranged from ‘High’ (n = 1, 2%) to ‘Critically Low’ (n = 50, 94%). Of the 7 critical AMSTAR-2 domains, 3 (6%) SRs had at least 4 of these domains met/partially met, with 4 (8%) having at least 3 met/partially met. Twenty-three (43%) SRs included RCTs and 41 (77%) included NRSIs. Of those SRs including RCTs or NRSIs, 12 (52%) and 11 (27%) examined bias risk, respectively.

Conclusions: We uncovered numerous systematic reviews in the swallowing sciences. Given the heterogeneity across SR outcomes, meta-meta-analyses are not possible at this time. Additionally, SRs lacked components including PICO descriptions, duplicate review, and heterogeneity analyses. Moving forward, it is prudent to continue to strive for excellence across all study conduct, including systematic reviews.

Does Change in Maximal Expiratory Pressure Predict Change in Cough Airflow After Training? A Secondary Analysis of a Randomized Controlled Trial

Session Title: Free Paper Session 3: Dysphagia Management: Treatments and Care Pathways

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Introduction: Cough is often impaired in people with Parkinson’s disease (PD). Effective coughing requires both muscle strength and skill; hence, strength is often a rehabilitation target. The relationship between improvement in strength and cough airflow measures has not been examined. Therefore, the aim of this study was to characterize and assess the relationship between the magnitude of change in respiratory strength and the magnitude of change in cough airflow for one strength and one skill-training program: expiratory muscle strength training (EMST) and sensorimotor training for airway protection (smTAP).

Method: This was a secondary analysis of a randomized controlled trial. Fifty-seven participants with PD completed pre- and post-assessments and 5 weeks of training. Outcomes were maximal expiratory pressure (MEP) and voluntary cough peak expiratory flow rate (PEFR), cough expired volume (CEV), and cough volume acceleration (CVA). Descriptive statistics assessed the direction of change for MEP and cough airflow; linear mixed models assessed relationships in the magnitude of change.

Results: Descriptive statistics (see Table 1) revealed that for EMST and smTAP groups, increased MEP most commonly occurred with increased CEV followed by CVA and PEFR. These percentages were greater in the smTAP group versus EMST group. Increased MEP occurred the least with increased CVA. The EMST group demonstrated more cases where increased MEP did not result in increased PEFR and CEV (Table 1). Linear mixed models revealed no statistically significant relationships in the magnitude of change between MEP and cough airflow outcomes.

Conclusions: The higher percentage of cases in which both MEP and cough airflow improved for the smTAP group may point to skill training—in addition to strength training—as important components of cough rehabilitation. However, the magnitude of change in MEP was not statistically associated with changes in voluntary cough airflow in this PD cohort.

| Group       | Direction Category | PEFR | CEV   | CVA  |
|-------------|--------------------|------|-------|------|
| EMST        | Positive MEP, Positive Cough | 14/29 (48%) | 18/29 (62%) | 15/29 (52%) |
| Negative MEP, Negative Cough | 0/29 | 0/29 | 0/29 |
| Positive MEP, Positive Cough | 12/29 (41%) | 8/29 (28%) | 11/29 (38%) |
| Negative MEP, Negative Cough | 3/29 (10%) | 3/29 | 0/29 |
| Positive Cough | 21/28 (75%) | 22/28 (79%) | 13/28 (46%) |
| Negative MEP, Negative Cough | 2/28 (8%) | 2/28 | 1/28 |
| Positive MEP, Positive Cough | 3/28 (11%) | 2/28 | 11/28 |
| Negative Cough | 2/28 (7%) | 2/28 | 3/28 |

Recommendations of Good Practices to Prevent Aspiration Pneumonia in Older Adults at Risk of Oropharyngeal Dysphagia: First Stage of a Delphi Study

Session Title: Free Paper Session 3: Dysphagia Management: Treatments and Care Pathways

Santos, J; Ribeiro, O; Jesus, I; Matos, M
University of Aveiro

Introduction: Aspiration pneumonia (AP) is a subset of pneumonia caused by the entrance of colonized food and fluids to the lungs of a person with impaired swallowing (oropharyngeal dysphagia; OD) and compromised immunologic function. As pneumonia leads the main causes of morbidity and mortality in the older population and is the second most common infection in nursing home residents, it is crucial to promote better practices of healthcare. The aim of this presentation is to describe the methodology used in the first stage of a Delphi study, whose purpose is to develop good practice recommendations.
Abstract

for nursing home staff regarding the prevention of AP in older adults at risk of OD.

Materials and Methods: The research question of our study was: Which interventions should nursing home staff adopt to prevent AP in older adults at risk for OD? Based on a scoping review of the literature, an etiological tree for AP was drawn (Fig. 1) to enable the selection of relevant associations. A structured search through the websites of the selected associations was conducted for extracting international guidelines and position statements regarding the prevention of AP. Complementarily, a systematic search of systematic reviews on the “prevention of aspiration pneumonia” in PubMed and in the Cochrane Database of Systematic Reviews with the same objective was performed.

Results: A total of 66 recommendations resulted from the searches and will be the basis of the first consensus survey to be judged by an expert panel in the first online round of the Delphi study. The recommendations covered the following topics: Oral hygiene, dysphagia management, nutrition, dementia, stroke, Parkinson’s disease, and end-of-life patients.

Conclusions: In the past few decades, several authors have reported the importance of preventing AP. As it is associated with several modifiable risk factors, it is hypothesized that it can be prevented by adopting evidence-based strategies and standards of care.

Motor Performance During Cough Rehabilitation in Parkinson’s Disease

Session Title: Free Paper Session 3: Dysphagia Management: Treatments and Care Pathways

Borders, J1; Hegland, K2; Troche, M1

1Teachers College, Columbia University; 2University of Florida

Introduction: Cough dysfunction is highly prevalent in Parkinson’s disease (PD) and associated with dysphagia and pneumonia, a leading cause of death in PD. There is growing evidence that cough can be volitionally modified and upregulated in a single session of a sensorimotor training in airway protection (smTAP). However, patterns of motor performance, defined as the ability to execute a motor skill (i.e., cough), across multiple treatment sessions remains unknown. Therefore, we sought to characterize and identify predictors of motor performance during five sessions of smTAP.

Methods: Twenty-eight individuals with PD participated in 5 smTAP sessions, each consisting of 25 cough trials. During each trial, participants were administered subthreshold capsaicin and instructed to “cough hard” to reach a target line set 25% above maximum peak expiratory flow rate (PEFR) at baseline. Demographic, cough, and swallowing variables were collected prior to treatment. Bayesian multilevel growth curve models assessed individual PEFR motor performance slopes, and their relationship with baseline characteristics.

Results: PEFR linearly increased 0.20 L/s per treatment session and variability decreased 7% each session. Baseline swallowing-related quality of life was negatively associated with motor performance, whereas baseline voluntary cough PEFR had a positive relationship. When controlling for baseline cough airflow, higher variability in the first treatment session predicted later improvements in PEFR.

Conclusions: Individuals with PD incrementally improved the strength of their cough across smTAP treatment sessions. Cough airflow consistency also improved with early treatment variability associated with better motor performance, replicating findings in the limb literature that suggest early task exploration may optimize motor control strategies. These findings may assist clinicians in understanding trajectories and correlates of performance during cough rehabilitation.

Post-stroke Oropharyngeal Dysphagia, Especially in Combination with Impaired Nutritional Status, is Detrimental for Quality of Life and Performance in Activities of Daily Living During Rehabilitation

Session Title: Free Paper Session 3: Dysphagia Management: Treatments and Care Pathways

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Introduction: Malnutrition and oropharyngeal dysphagia (OD) are highly prevalent after stroke, and both are associated with poor clinical outcomes [Gomes, 2016; Rofes, 2018]. We assessed the nutritional status of ischemic stroke patients with or without OD in rehabilitation centers. Associations between OD, presence of malnutrition, quality of life (QoL), and performance in daily living (ADL) were investigated.

Methods: In this exploratory, cross-sectional study in 2 rehabilitation centers in Germany, ischemic stroke patients with (N = 36) or without (N = 49) OD were included between 2 and 12 weeks post-stroke. Patients were age- and sex-matched to healthy reference (HR) subjects. Malnutrition, QoL, and ADL were assessed with the MNA-SF, EQ-5D-5L, and the Barthel Index, respectively.

Results: More than half of the stroke patients had a low nutritional status. Presence of OD after stroke was more often accompanied with poor clinical outcomes [Gomes, 2016; Rofes, 2018]. We assessed the nutritional status of ischemic stroke patients with or without OD in rehabilitation centers. Associations between OD, presence of malnutrition, quality of life (QoL), and performance in daily living (ADL) were investigated.

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Methods: Swallowing outcomes and swallowing kinematics. The rat model of chronic use of thickened liquids is viable for studying functional swallowing outcomes. Future studies building on this work will interrogate the biological mechanisms underlying these changes in swallow function.

Conclusion: Stroke patients in stationary sub-acute rehabilitation have impaired nutritional status, lower QoL, and more difficulties with ADL compared to matched healthy subjects. OD after stroke further exacerbates these parameters. Combined OD and (risk for) malnutrition seems particularly detrimental for QoL and ADL. Adequately addressing both conditions seems particularly important in these most vulnerable patients.

Effects of Chronic Use of Thickened Liquids in a Rat Model: A Pilot Study

Session Title: Free Paper Session 3: Dysphagia Management: Treatments and Care Pathways
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University of Wisconsin—Madison

Introduction: Dysphagia is associated with negative health outcomes including aspiration pneumonia, malnutrition, and mortality. A common clinical intervention for oropharyngeal dysphagia is thickened liquids, which slow the flow rate of a liquid bolus to immediately reduce chance of aspiration. However, due to limitations of clinical studies, it is currently unknown whether thickened liquids remain effective over time, or their chronic effects on the swallowing sensorimotor system. The purpose of this pilot study was to demonstrate the feasibility of a rat model for studying the chronic effects of thickened liquid on functional swallowing outcomes and swallowing kinematics.

Methods: Male Sprague–Dawley rats received ad libitum access to nectar-thick liquids ($n=6$) or honey-thick liquids ($n=6$) for 12 h per day, and food for 24 h per day, for 7 weeks. Rats underwent videofluoroscopic swallow study of assigned texture at baseline and post-7 weeks of thickened liquids. We examined the effect of thickened liquids on: respiratory-swallow pattern, percentage of swallows with pharyngeal residue, and percentage of daily fluid intake consumed relative to recommended intake normalized by body weight.

Results: All rats completed the study, and no rats exhibited significant loss of body weight from baseline. Following 7 weeks of thickened liquids, $n=4/6$ rats of the nectar-thick group, and $n=5/6$ rats of the honey-thick group, demonstrated an aberrant post-swallow inhale pattern. Both thickener groups demonstrated an increase in percentage of swallows with pharyngeal residue. Nectar-thick group and honey-thick group decreased percent consumed of recommended fluid intake to average 70.1% and 59.9%, respectively.

Conclusion: The model of chronic use of thickened liquids is viable for studying functional swallowing outcomes. Future studies building on this work will interrogate the biological mechanisms underlying these changes in swallow function.

Identifying Dysphagia and Its Demographic Associations in Older Adults Using Electronic Health Records: A National Longitudinal Observational Study in Wales (United Kingdom) 2008–2018

Session Title: Free Paper Session 4: Adult Non-neurogenic Dysphagia: Etiology, Pathophysiology, and Clinical Trials
Smithard, D; Hollinghurst, J

Background: Dysphagia has a prevalence of up to 30% in older people. Little research has been undertaken using routine coding of dysphagia in medical electronic health records (EHR). Aim: To investigate the prevalence of dysphagia as recorded in EHRs and its association with age, frailty, gender, and deprivation.

Study Design and Setting: Cross-sectional longitudinal cohort study for over 400,000 older adults (65 + years of age) in Wales per year from 2008 to 2018.

Methods: The Secure Anonymized Information Linkage databank was used to identify dysphagia diagnoses in primary and secondary care EHRs in the principality of Wales. We used chi-squared tests and multivariate logistic regression to investigate associations.

Results: The percentage of people with dysphagia reported at any time prior to the cohort survey date increased from 3.6 to 5.8% between 2008 and 2018. <1% of individuals had a documented dysphagia diagnosis the year before the survey date. Dysphagia was significantly associated ($p < 0.05$) with increasing age, frailty, and deprivation. Odds ratios (OR [95% confidence intervals]) were increased for a dysphagia diagnosis with increased age (reference 65–74; aged 75–84 OR 1.09 [1.07, 1.12], 85 + OR 1.23 [1.20, 1.27]), frailty (reference fit: mild frailty 2.45 [2.38, 2.53], moderate frailty 4.64 [4.49, 4.79] and severe frailty 7.87 [7.55, 8.21]), and deprivation, most deprived, 2: 0.92 [0.89, 0.95], 3: 0.89 [0.86, 0.92], 4: 0.87 [0.84, 0.90]. 5. Least deprived: 0.91 [0.88, 0.94].

Conclusions: Dysphagia is associated with increasing age, frailty, and deprivation. The prevalence of dysphagia documented on EHR was low, suggesting under reporting. The under reporting of dysphagia has the potential to impact significant on health and social care costs in future.

An International Core Outcome Set for Critical Care Dysphagia Trials

Session Title: Free Paper Session 4: Adult Non-neurogenic Dysphagia: Etiology, Pathophysiology, and Clinical Trials
Prevalence of Swallowing Impairments and Comorbidities in Hip/Femur Fractures Admissions in the Elderly: A Prospective Study

Session Title: Free Paper Session 4: Adult Non-neurogenic Dysphagia: Etiology, Pathophysiology, and Clinical Trials

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Introduction: High prevalence of swallowing impairments (SI) is well documented in elderly. Evidence shows that SI are likely to get diagnosed when admitted to hospital for acute conditions, such as hip/femur fracture; not typically associated with new onset dysphagia. Yet, little is known about the concurrent comorbidities leading to SI and changes in nutritional and swallowing status before, during and after hospitalization in this population.

Materials and Methods: In this prospective cohort study over a 1-year period (01/2020–01/2021), 151 patients with hip/femur fractures consecutively admitted to the regional hospital (mean age 83.9 ± 8 years, 76.8% female) were included. Nutritional status, SI (FEES evaluated when referred), cognition, and any concurrent comorbidities were captured. Non-parametric comparisons (Mann–Whitney) and correlations (Spearman’s) were employed (SPSS 22.0).

Results: On admission, half patients showed mild dementia, 52.3% were at risk of nutritional compromise and 41% were undernourished (Mini Nutritional Assessment). 15% admitted patients had more than 5 comorbidities. On admission, only 9.9% had a FOIS score < 5. FEES was performed in 19 patients (med Functional Oral Intake-FOIS:6). Female (P = 0.035) and patients with neuropsychiatric and respiratory diseases showed more SI symptoms. Patients’ median hospital length of stay (LOS) was 40 days. On discharge, patients showed significant improvement in dysphagia on FEES and FOIS score (P = 0.001). LOS was increased by 10 days in patients with dysphagia.

Conclusions: Our results showed higher age range, nutritional compromise, and number of comorbidities in patients with SI admitted with hip/femur fracture. The Presence of dysphagia increased LOS in patients in our study. Nutritional and dysphagia screening are crucial for the appropriate medical management to guide referrals to dysphagia specialists and speech and language pathologists.
outcome metrics, with the exception of UES relaxation time, in healthy adults. Further research is required across other bolus volumes and consistencies and in clinical populations to confirm this.

Investigating the Effect of Saline on Normal Swallow Biomechanics in Healthy Adults: An Experimental Study Using High-Resolution Pharyngeal Manometry

Session Title: Free Paper Session 5: Dysphagia Assessment: Screening, Clinical Evaluation, and Instrumental
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Trinity College Dublin

Introduction: High-resolution pharyngeal manometry (HRPM) with impedance uses saline bolus to capture conductivity of the bolus. The impact of saline on swallowing biomechanics has not been investigated to date. This study investigated the effects of two saline concentrations compared to non-saline bolus on normal swallowing pressures in healthy adults using HRPM.

Methodology: Non-randomized, experimental, prospective and quantitative study was designed. HRPM data were collected from twenty healthy adults (eight males; 22–55 years) using solid-state HRPM equipment with 4.2 mm circumferential catheter (36 pressure sensors spaced 1 cm). TriPLICATE trials of 5 ml and 10 ml IDDSI Level 0 fluids with 0.9% saline, 0.45% saline, and non-saline were administered to acquire pressure data. Swallows were analyzed using Swallow GatewayTM (www.swallowgateway.com, a cloud-based semi-automated online platform) to derive outcome measures: pharyngeal contractile integral (PhCI), velopharyngeal contractile integral (VCI), mesopharyngeal contractile integral (MCI), hypopharyngeal contractile integral (HCl), UES relaxation time (UES RT) and UES integrated relaxation pressure (UES IRP). To determine the effect of saline, Friedmann ANOVA was completed and post hoc analysis was carried out using Wilcoxon signed rank test.

| HRPM outcome metrics (unit) | Definitions | |
|-----------------------------|-------------|---|
| PhCI (mmHg cm^-1 s^-1)      | PhCI is the global measure of contractile vigor spanning from the velopharynx superiorly to the upper margin of UES inferiorly | |
| VCI (mmHg cm^-1 s^-1)       | VCI is the pressure measure of contractile vigor spanning within the velopharyngeal region only | |
| MCI (mmHg cm^-1 s^-1)       | MCI is the pressure measure of contractile vigor spanning within the mesopharyngeal region only | |
| HCl (mmHg cm^-1 s^-1)       | HCl is the pressure measure of contractile vigor spanning within the hypopharyngeal region only | |
| UES IRP (mmHg)              | UES IRP is a measure of the extent of UES relaxation pressure | |
| UES RT (s)                  | UES RT is a measure of UES relaxation duration | |

Results: 360 swallows were analyzed. VCI increased with an increase in saline concentration (p = 0.047 and p = 0.019 for 5 ml and 10 ml bolus, respectively). PhCI, MCI, and HCl were not significantly altered by different saline concentrations. There was no significant change in UES RT and UES IRP with a change in saline concentration.

Conclusion: This study provides evidence on the effect of saline on normal swallow biomechanics and the need for understanding the effects of saline solution on swallow physiology when evaluating HRPM examination. Advances the knowledge of normal and abnormal swallow and ameliorates dysphagia assessment.

Betrayed by Aggregation: Maximum Penetration–Aspiration Scale Scores Reduce Statistical Power and Bias Effect Size Estimates

Session Title: Free Paper Session 5: Dysphagia Assessment: Screening, Clinical Evaluation, and Instrumental
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1Teachers College, Columbia University; 2Columbia University

Introduction: Multiple boluses are usually administered in clinical and research swallowing assessments; however, researchers commonly aggregate the Penetration–Aspiration Scale (PAS) in statistical analyses by using the highest score to indicate the greatest degree of dysfunction. This approach may impact clinical translation of findings in that the maximum score may not fully represent impairment profiles or capture within-subject variation. An alternative approach is multilevel modeling which can account for multiple trials by incorporating random effects. This study examined whether PAS aggregation affects power and accuracy of effect size estimates compared to a multilevel approach.

Methods: A hypothetical within-subject design was simulated with a Monte Carlo method to represent a treatment study to improve swallowing safety in Parkinson’s disease. A range of clinical-research scenarios were simulated which varied the sample size, treatment effect size, PAS variability, and PAS categorization (ordinal vs. binary). Multilevel and aggregated regression models were performed for each simulated scenario. The proportion of p-values < 0.05 estimated power for “small” (OR = 1.50) and “medium” effects (OR = 3.00). Model effect size estimates were compared to inputted effect sizes to indicate the amount of bias.

Results: Compared to multilevel models, PAS aggregation reduced power by 28% and biased effect size estimates by 52%. Multilevel models maximized power across all simulated scenarios, most notably for small sample sizes with a medium effect (40% increase). Binary PAS categorizations biased effect size estimates by 175%.

Conclusions: Multilevel models improve researchers’ ability to detect and estimate treatment effects in smaller samples, providing an ecologically sensitive analysis of change. Future research will extend this work to other patient populations and clinical-research scenarios.
Construct Validity and Reliability of the Yale Pharyngeal Residue and Severity Rating Scale: Performance in Videos and Effect of Bolus Consistency

Session Title: Free Paper Session 5: Dysphagia Assessment: Screening, Clinical Evaluation, and Instrumental

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Introduction: The Yale Pharyngeal Residue Severity Rating Scale (YPRSRS) provides an image-based assessment of the severity of pharyngeal residue based on fiberoptic endoscopic evaluation of swallowing (FEES). The YPRSRS exhibits sufficient validity and good/excellent reliability. However, the psychometric characteristics have only been tested on FEES frames and with pureed food. The aim is to analyze the construct validity and reliability of the YPRSRS on FEES videos and frames and the effect of bolus consistency.

Materials and Methods: Thirty pairs of FEES videos and frames (10 with thin liquids IDDSI 1, 10 with pureed food IDDSI 4, and 10 with regular food IDDSI 7) that received the same YPRSRS score by two independent raters were selected for the study. A total of 29 raters participated to the study, including otorhinolaryngologists and speech and language pathologists. Participants independently assessed FEES material using the YPRSRS twice, with at least 15 days between the first and second evaluation. For construct validity, the agreement between the score of the raters and the score of the experts was analyzed.

Results and discussion: The construct validity showed almost perfect agreement for frames (Cohen’s kappa = 0.861–0.899) and substantial agreement for videos (k = 0.759–0.798). Inter-rater reliability was almost perfect for frames (k = 0.858–0.891) and substantial for videos (k = 0.732–0.736). Intra-rater reliability was almost perfect for both frames (Kendall’s W = 0.836–0.917) and videos (W = 0.813–0.828). Concerning the effect of bolus consistency, inter- and intra-rater reliability ranged from fair to moderate for liquids (k = 0.582–0.601; W = 0.365–0.516), from substantial to almost perfect for pureed food (k = 0.842–0.889; W = 0.791–0.845), and from moderate to almost perfect for regular food (k = 0.841–0.904; W = 0.548–0.871).

Conclusion: The YPRSRS showed satisfactory psychometric properties also in FEES videos, but reliability is significantly influenced by bolus consistency.

Assessing Dysphagia Using Cervical Auscultation with Swallow Respiratory Sounds: Comparison with Fees

Session Title: Free Paper Session 5: Dysphagia Assessment: Screening, Clinical Evaluation, and Instrumental

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Cervical auscultation adds to the accuracy of the Clinical Swallow Examination (CSE) and ongoing clinical reviews for holistic dysphagia management and person-centered care. Literature, however, identifies the importance of the swallow-respiratory coordination and, as such, further research is needed to investigate CA validity and reliability with added respiratory information, pre- and post-swallow. This study investigated rater reliability and validity (sensitivity and specificity) of CA using thin, mildly thick and extremely thick fluids considering both swallow and pre–post-respiratory sounds, as compared with Flexible Endoscopic Evaluation of Swallowing (FEES) reference test.

Method: Eighty-five swallow-respiratory sounds from 23 patients were rated by eight international CA-trained SLPs to answer three clinical questions: (1) is the swallow safe on this consistency? (2) is the patient dysphagic?

Results: Data showed high sensitivity (85.4%), and specificity (80.3%) for the safe measurement with good intra-rater and moderate inter-rater reliability (k = 0.65, 0.58, respectively). For the dysphagia measurement, high sensitivity (80.1%) but low specificity (22.9%) with good intra-rater and moderate inter-rater reliability was shown (0.9 and 0.41, respectively).

Conclusion: Data demonstrate high sensitivities and moderate-good reliability for identifying if a swallow is safe or dysphagic. Results add to the growing body of evidence supporting the use of CA as an adjunct to the CSE/ ongoing review, which is essential for holistic, person-centered dysphagia management.

Reliability and Validity of a New Visuoperceptual Measure for Videofluoroscopic Swallow Study Analysis: Results of a Pilot Study

Session Title: Free Paper Session 5: Dysphagia Assessment: Screening, Clinical Evaluation, and Instrumental

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Introduction: The Videofluoroscopic Swallow Study (VFSS) is a gold-standard dysphagia assessment, commonly analyzed visuoperceptually. However, current visuoperceptual measures have inadequate or unclear psychometric properties according to COConsensus-based Standards for the selection of health Measurement INstruments (COSMIN) quality standards. In response, a new measure was developed following an international Delphi study, which identified 32 domains that were operationalized into a 102-item measure. The aim of this study was to determine the quality of preliminary psychometric properties of the measure.

Methods: VFSS were conducted for 39 patients in a standardized protocol involving 11 trials using four different textures (thick, thin, pudding and a cracker) in progressively increasing volumes (5; 10 and 20 ml). A speech pathologist, a radiologist, and an ENT-Phoniatrian analyzed recordings using the pilot measure. Repeated ratings were performed on 15% of the sample. Psychometric properties were analyzed under a classical testing framework using COSMIN quality criteria. Feasibility was reviewed by all raters.

Results: Inter- and intra-rater reliability indicated excellent agreement. Exploratory factor analysis revealed nine factors. Internal consistency of each factor ranged from good to excellent, with the overall measure in the excellent range. All but one factor correlated positively with functional health status and quality of life outcome measures (convergent validity/hypothesis testing), indicating the new VFSS measure is assessing the target construct. Feasibility analyses and preliminary statistical analyses were used to draft a final measure consisting of 57 items.

Discussion/Conclusion: This study is the first application of the COSMIN to VFSS measure development. Initial data show robust psychometric properties of the new measure. The new measure will continue to be validated using a large sample size in future research.
Dynamic Imaging Grade of Swallowing Toxicity Scale: The Challenges of Observer Agreement In Fees

Session Title: Free Paper Session 5: Dysphagia Assessment: Screening, Clinical Evaluation, and Instrumental

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Introduction: The Dynamic Imaging Grade of Swallowing Toxicity (DIGEST) was developed to quantify dysphagia severity in head and neck cancer (HNC) patients. It was validated based on videofluoroscopic swallowing study (VFSS) and fiberoptic endoscopic evaluation of swallowing (FEES). The DIGEST evaluates swallowing safety and efficiency based on two variables: the Penetration–Aspiration Scale (PAS) and pharyngeal residue (PR), respectively. Observers’ agreement on these variables is the first step of validation as it is not possible to have a valid scale if measurements are not reproducible. The aims of this study are: to measure observer agreement of the DIGEST variables for FEES; to describe the training of the observers and the development of a structured DIGEST manual.

Methods: Twenty-seven HNC patients underwent a standardized FEES using three consistencies. The variables were measured by two independent observers. The intra- and interobserver agreement on each variable was determined per consistency using linear weighted kappa coefficient. Challenges and pitfalls of measuring variables were systematically analyzed to develop a structured manual with well-defined descriptions and images. The effect of training on agreement using the manual was analyzed.

Results: Observer agreement for PAS was sufficient (> 0.72). Bolus consistency and implementation of the manual did not have an effect on agreement levels for PAS. However, the levels of agreement for PR were not sufficient (> 0.59) and were influenced by bolus consistency. The levels of agreement for PR improved considerably when using the manual (> 0.82).

Conclusion: This study described the training for FEES-based DIGEST measurements in detail including the challenges and pitfalls to obtain sufficient levels of observer agreement. The effect of training on agreement using a structured DIGEST manual resulted in significant improvement of the agreement levels for pharyngeal residue.

Visual Analysis of Swallowing Efficiency and Safety (Vases): Establishing Criterion-Referenced Validity and Concurrent Validity

Session Title: Free Paper Session 5: Dysphagia Assessment: Screening, Clinical Evaluation, and Instrumental

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Introduction: Visual Analysis of Swallowing Efficiency and Safety (VASES) is a standardized method for rating pharyngeal residue, penetration, and aspiration during FEES. Research demonstrates high reliability among novice clinicians with VASES; however, the validity has not yet been established. Therefore, the primary aim of this study was to examine the criterion-referenced validity of VASES. As a secondary aim, we examined the concurrent validity of using verbal numerical ratings as a potential substitute for visual analogue scales for VASES.

Materials and Methods: 57 novice raters were prospectively recruited to rate 26 FEES images (2 × each, randomized)—once using VASES and once using a criterion-referenced scale. Ratings were made for the valleculae, piriforms, epiglottis, laryngeal vestibule, vocal folds, and subglottis. Criterion validity was determined by examining the correlation between VASES and the criterion-referenced scales (Yale and BRACS). The novice raters also provided visual analogue scale ratings following verbal numerical prompts. Concurrent validity was determined by examining the agreement between verbal numerical and visual analogue scale ratings.

Results: Spearman’s correlation revealed strong relationships between VASES ratings and criterion-referenced ratings across all landmarks (r = 0.882-0.915) (Fig. 1). Lin’s concordance revealed substantial agreement between numerical ratings and visual analogue scale ratings (ρc = 0.986; Fig. 2).

Conclusion: The strong correlations between VASES and the criterion-referenced scales suggest that VASES is a valid method for interpreting pharyngeal residue, penetration, and aspiration during FEES. Furthermore, numerical ratings exhibited substantial agreement with visual analogue scales. This suggests that clinicians could provide verbal numerical ratings in lieu of visual analogue scale ratings as a potential way to enhance the ease and feasibility.
How do You Score the PAS? Comparing Reliability of Component and Derivative Scoring Methods

Session Title: Free Paper Session 5: Dysphagia Assessment: Screening, Clinical Evaluation, and Instrumental

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Introduction: Clinicians and researchers may score the Penetration– Aspiration Scale (PAS) in different ways, depending on swallow presentation and clinical preferences. This study reports on reliability estimates for component and derivative scoring methods for the PAS, when used by different research groups.

Methods: Randomly selected Videofluoroscopy Swallow Studies from the Swallowing Treatment using Electrical Pharyngeal Stimulation (STEPS) trial were re-scored by a new researcher and compared to the scores from the original STEPS trial (inter-rater reliability). A portion of the data were re-scored for intra-rater reliability. Each file contained data from one patient at one timepoint (baseline, two-, or twelve weeks) comprising up to 7 boli of 6 × 5 ml boli and 1 × 50 ml bolus, of thin fluids, 40% w/v, at a variety of frame rates. A total of 50 files from 18 participants were scored, resulting in 719 swallows included for final analysis. Scores were compared both at a component level, such as every swallow in the bolus (including clearing swallows) and first swallow in the bolus and at a derivative level, such as mean worst PAS score (of 7 boli). Reliability was computed using the intraclass correlation coefficient (ICC) estimate with 95% confidence intervals, using 2-way random effects, single measures, absolute agreement.

Results: Component scores: PAS reliability for every swallow (719) in each bolus showed moderate reliability: ICC 0.743 (0.708–0.775). The first swallow (293) in each bolus also showed moderate reliability: 0.747 (0.692–0.794). Derivative scores: The mean worst PAS score (49) from all 7 boli showed excellent reliability: 0.914 (0.853–0.951), as did the mean worst 50 ml PAS score (38): 0.913 (0.836, 0.955). All intra-rater scores were excellent.

Conclusions: Component PAS scores yield lower reliability estimates than derivative PAS scores when used by different groups. Further debate on PAS scoring methods is required.

Persistent Dysphagia and Dysphonia Among Adults with Covid-19 at Time of Hospital Discharge: A Multisite Prospective Cohort Study

Session Title: Free Paper Session 5: Dysphagia Assessment: Screening, Clinical Evaluation, and Instrumental

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Background: This study aims to (i) assess the presence and degree of persistent dysphagia and dysphonia among adults hospitalized with COVID-19 at the time of hospital discharge; (ii) identify predictors of persistent dysphonia and dysphagia at hospital discharge and (iii) establish differences in persistent dysphagia and dysphonia between intubated and non-intubated adults.

Methods: A multisite prospective observational cohort study was conducted across fifteen acute hospitals in the Republic of Ireland from March 1st, 2020, to May 31st, 2021. Outcome measures at hospital discharge were the Functional Oral Intake Scale (FOIS) for swallowing and GRBAS global ratings for perceptual voice quality. Outcomes from adults requiring intubation were compared to those who were not intubated.

Results: Six hundred (600) adults (355 males; median age 77 years; IQR 66–84 years) met inclusion criteria. Median pre-admission swallow status was FOIS Level 7 (IQR 6–7). Median length of hospital stay was 31 days (IQR 16–54 days). At hospital discharge, 11.3% remained tube dependent (FOIS Level 1–3) and 69.7% remained on altered oral diets (FOIS Level 1–6). 18.7% had persistent dysphonia (GRBAS 1–3) at hospital discharge (8% moderate or severe). Within the total group, intubation was a predictor of dysphagia at hospital discharge (OR 3.446; 95% CI 2.139–5.553; p = 0.000) but it was not a predictor of dysphonia. There was a significant difference in FOIS scores (p = 0.000) but not in GRBAS scores (p = 0.451) between intubated (n = 164) and non-intubated (n = 336) adults at hospital discharge.

Discussion: This study demonstrates that COVID-19-associated dysphagia and dysphonia are not resolved for many adults at hospital discharge. Findings will assist in the prioritization of inpatient services to minimize complications and emphasize the need for outpatient follow-up.

The Role of Transient Receptor Potential Ankyrin 1 Channels (Trpa1s) in Triggering the Swallowing Reflex in Rats

Session Title: Free Paper Session 6: Swallowing Physiology, Neurophysiology and Imaging

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Introduction: TRPA1s are non-selective cation channels widely expressed in neurons and non-neuronal cells. They have been reported as chemosensors and mechanosensors, however, to the best of our knowledge, no studies have systematically investigated their specific roles in triggering of the swallowing reflex. Understanding the specific role of TRPA1s in triggering the reflex can be beneficial for developing therapeutics to manage dysphagia.

Materials and Methods: We assessed the expression of TRPA1s in the superior laryngeal nerve (SLN)-innervated swallowing-related regions and in the nodose–petrosal–jugular ganglionic complex (NPjc) and examined whether they act as chemosensors, or mechanosensors in triggering of the reflex in rats.

Results: TRPA1s were predominantly expressed on thin nerve fibers and fibroblast-like cells in the SLN-innervated regions and on small to medium-sized SLN-afferents in the NPjc. They were not localized on thick nerve fibers, or sensory corpuscle-like nerve structures present in the SLN-innervated regions. Their expression on large-sized SLN-
The Effect of Repeated Measurement, Age, and Sex on Measures of Pharyngeal Area

Session Title: Free Paper Session 6: Swallowing Physiology, Neurophysiology and Imaging

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Introduction: Videofluoroscopic (VF) measurements of pharyngeal swallow mechanics can be used to demonstrate age- and disease-related changes in swallowing. Pharyngeal lumen area is one such parameter that may reveal differences between healthy individuals and those with dysphagia, e.g., due to age-related atrophy or sarcopenia. However, the stability of repeated pharyngeal area measures within the same individual, or between individuals as a function of sex or age remains to be explored. We hypothesized that healthy adults would show stability across repeated measures of pharyngeal area at rest (PhAR), but that larger PhAR would be seen in men vs women and in older vs younger adults.

Methods: We collected data from 87 healthy adults (44 males, mean age 46 years, range 21–82) who completed a VF including boluses of 30 images/s. Trained raters identified the swallow rest frame after each swallow. Pixel-based measures of unobliterated pharyngeal area were taken on these rest frames, in %/(C2-4)2 units. Linear mixed-model analyses of variance with a factor of sex, a covariate of age, and a repeated factor of task repetition were used to explore differences in PhAR, across the first 12 available measures per participant (n = 1044 swallows).

Results: The analysis did not find any significant variations across repeated measures of PhAR within participant (p = 0.09). A significant sex X age interaction was seen (p = 0.04): younger males had significantly larger PhAR than females (p = 0.001), but females showed larger PhAR with advancing age (R = 0.45; adjusted R² = 0.18).

Conclusion: These data confirm our hypothesis that healthy individuals show stability in PhAR across repeated measurements within the same individual. Significant age and sex differences in PhAR lend support to the use of PhAR as one parameter by which to quantify differences between healthy individuals and those with dysphagia.
Facilitatory Effect of Atropine on Swallowing Evoked by Distilled Water in Anesthetized Rats

Session Title: Free Paper Session 6: Swallowing Physiology, Neurophysiology and Imaging

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Introduction: Previous reports suggest patients who had an Anti-cholinergic Cognitive Burden (ACB) score of more than three points is at high risk for dysphagic symptoms. However, few studies have evaluated how anticholinergic drugs have an impact on the swallowing neural network and initiation. This study aimed to investigate the effect of atropine on the initiation of swallowing.

Materials and Methods: Experiments were carried out on 70 urethane-anesthetized Sprague-Dawley male rats (1.3 g/kg, ip). Swallowing reflex was evoked by either topical laryngeal application of a small amount (3 µl) of distilled water (DW), saline, citric acid (10⁻² M) or capsaicin (10⁻⁹–10⁻⁵ M), upper airways (UA) distention with a continuous airflow (8 ml/s), or electrical stimulation of the right side of superior laryngeal nerve (SLN, 30 Hz, 0.2-ms pulse duration, 10-s train, 4.8–125 μA). A swallow was identified by electromyographic burst of the left side of suprahyoid and thyrohyoid muscles. To investigate anticholinergic effects on the initiation of swallowing, three reagents were delivered intravenously: muscarinic acetylcholine receptor (mAChR) antagonist atropine (1 mg/kg), methylatropine (a CNS-impermeant form of atropine, 1 mg/kg) or saline (the solvent for both reagents).

Results: After atropine administration, the number of DW-evoked swallows was significantly larger than baseline (before administration), and that of saline- and UA-evoked swallows were tended to be larger than baseline. Atropine also tended to increase the number of citric acid- and capsaicin-evoked swallows compared with control rats. In contrast, the number of DW-evoked swallows was not changed following methylatropine or saline administration. The swallowing threshold of SLN stimulation was significantly lower following atropine administration than baseline.

Conclusions: These results suggest that atropine facilitates DW-evoked swallows via central mAChR actions.

Bioenergetic Measures in Intrinsic Tongue with Aging and Exercise

Session Title: Free Paper Session 6: Swallowing Physiology, Neurophysiology and Imaging

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Introduction: Age related changes in swallowing function are often treated using tongue exercise. Previous studies have shown that aging and exercise are associated with changes in muscle fiber type composition and glycogen content; however, there are no previous studies of these two factors within the intrinsic tongue muscles (IT). We used a rat model of tongue exercise to test the hypothesis that IT glycogen content will increase with exercise and decrease as a function of aging; there will be a higher proportion of type IIa myosin heavy chain (MyHC) in IT due to aging and that exercise will decrease the proportion of type IIb MyHC in IT in both groups.

Materials and Methods: We randomly assigned 20 young adult and 20 old Fischer 344/Brown Norway rats to either an 8-week tongue exercise group or a control group that received a sham exercise condition. IT muscles were dissected from the tongue and were evaluated for MyHC protein isoforms (%) by gel electrophoresis and glycogen content (mg glycogen/g muscle) by a colorimetric plate assay.

Results: No significant interaction effects between age and exercise were observed. Results suggest trends of increased glycogen content after exercise in young adult rats and decreased glycogen content after exercise in old rats. However, there were no significant main effects for age or exercise on IT glycogen content. Preliminary MyHC results demonstrated a significant decrease in MyHC type IIb and a trend for
an increase of MyHC type IIa with age in IT, but no significant differences between groups as a function of exercise.

**Discussion:** Rat IT muscles may demonstrate an adaptive response in glycogen content following exercise and in MyHC composition with aging. This suggests an age-related change in muscle biochemistry and an age-related decrease in capacity to modify available energy storage with tongue exercise.

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