Abstracts without Session Assigned

A Thousand and a Hundred Forty Peroral Endoscopic Myotomy for Esophageal Achalasia: 10 Years’ Experience from a Single Tertiary Center

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Introduction: Esophageal achalasia is most commonly treated with endoscopic dilation or laparoscopic Heller myotomy. Peroral endoscopic myotomy (POEM) has recently been described as a novel treatment for achalasia performed in a single tertiary center within 10 years.

Materials and Methods: Between June 2010 and May 2019, POEM was performed in 1140 consecutive patients with achalasia. POEM procedure consisted of the following step: firstly, submucosal tunnel was created and extended below the lower esophageal sphincter (LES) onto the gastric cardia after a mucosal incision was made; then endoscopic myotomy of circular muscle bundles was done; finally, the mucosal entry was closed by hemostatic clips. The Eckardt score and manometry were used to evaluate the outcomes.

Results: POEM was successfully performed in 1115 of 1140 cases (97.8%). Mean procedure time was 42.1 min (range 33–86) and mean myotomy length was 9.5 cm (range 7–16). Mucosal perforations occurred in 23 (2%) patients during submucosal tunnel creation, major bleeding occurred in 15 (1.3%) patients, and 29 (2.5%) patients suffered pneumothorax immediate after procedure. All the complications were managed conservatively. During a mean follow-up period of 49.3 months (range 5–89 months), treatment success was achieved in 1005/1140 patients (88.2%). Mean LES pressure was 57.5 mmHg (29.2–83.1) and 15.6 mmHg (5.2–23.1) before and after the procedure (P = 0.000), respectively. Mean Eckardt score was 6.1 (4–11, median 6) and 0.6 (0–3, median 1) before and after POEM, respectively (P = 0.000). In a multivariate analysis, no independent predictor of treatment success was found. 215 patient (18.9%) developed mild reflux symptoms and required intermittent medication with proton pump inhibitors during the follow-up.

Conclusion: Our study demonstrated that POEM is a safe, and effective treatment for achalasia during a long-term follow-up. Further studies are warranted to compare the clinical outcomes of POEM with other treatment modalities.

Efficacy and Safety of Peroral Endoscopic Myotomy for Achalasia in Adolescents and Young Adults: 10 Years’ Experiences from a Large Volume Center

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Introduction: Data on peroral endoscopic myotomy (POEM) for achalasia in adolescents and young adults (AYA), especially with long-term follow-up, are rarely reported. This study was aimed to determine the long-term follow-up results of POEM for achalasia in AYA.

Materials and Methods: A retrospective study was conducted in an academic, tertiary care, medical center, in which all AYA (aged 9–25 years) with achalasia undergoing POEM between February 2010 and January 2019 were identified from endoscopy databases. Data on demographics, perioperative parameters, and complications were collected and analyzed.

Results: A total of 133 AYE (mean age 16.3 years) were enrolled. The subtypes of achalasia were type I-44, type II-79, type III-8, and unclassified-2 based on Chicago classification. POEM was successfully performed in 129 of 133 cases (97%). The mean procedure time for the entire cohort was 52 min (range 45–84 min). No serious intraoperative and postoperative adverse events were encountered. During a mean follow-up time of 50.2 months (range 9–93 months), treatment success was achieved in 89.5% (119/133) patients. There was a significant improvement of symptoms relief (mean Eckardt score decreased from 7.3 to 0.8, P = 0.000) and LES pressure decrease (from 34.6 mm Hg to 12.3 mm Hg, P = 0.001) after POEM. Erosive esophagitis occurred in 14.8% (8/54) AYA. By 24-h pH test, GER was detected in 11.3% (6/32) patients.

Conclusion: POEM is effective and safe in the AYA population, with the high rates of clinical success and low rates of complication during the long-term follow-up.
Abstract

Peroral Endoscopic Myotomy (POEM) Versus Pneumatic Dilation (PD) for Achalasia: A Systematic Review and Meta-Analysis

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Introduction: Presently, the primary endoscopic options for the treatment of achalasia are peroral endoscopic myotomy (POEM) and pneumatic dilation (PD). But the clinical outcomes of POEM and PD for achalasia have not yet to be fully evaluated. So we aimed to compare the clinical outcomes between the two treatment modality.

Materials and Methods: We searched all the relevant studies published up to September 2019 examining the comparative efficacy between POEM and PD. Outcomes included success rate, Eckardt score, lower esophageal sphincter pressure, and adverse events. Outcomes were documented by pooled risk ratios (RR) and mean difference (MD) with 95% confidence interval (CI) using Review Manager 5.3.

Results: Seven studies with a total of 619 patients were included. There were 298 patients underwent POEM treatment and 321 patients underwent PD treatment. The clinical success rate was higher in POEM group than that in PD group, with a mean difference of 1.14 (95% CI, 1.06–1.22, p = 0.0002, I2 = 61%) and 3.78 (95% CI, 1.41–10.16, p = 0.008, I2 = 0%). There was a trend toward a significant positive correlation between scores on NNS subscale and PMA at the assessment time (p = 0.08). Unexpectedly, Infants with higher CA scored lower on behavioral organization subscale (p = 0.02). No significant correlations with the POFRAS scores were observed for 1 and 5 min Apgar scores.

Conclusions: Our results verified that birth weight and GA should continue to be considered as indicators to oral feeding readiness and NNS exercise in very premature infants.

Physiological Stability During Swallowing Exercise

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Introduction: Current study investigated evidence of physiological disturbance in preterm infants receiving swallowing exercise (SE). SE is a swallowing rehabilitation exercise that put a bolus of 0.05–0.2 mL of milk directly on the medial–posterior part of the tongue via a syringe (that connected to finger feeder in this study). Because of using milk in this exercise, ensure of being safe for preterm infants is vital and important.

Methods: SE provided one episode a day, 15 min before feeding, for 10 days period. 10 preterm infants with mean gestational age 28 weeks and weight 1256.9 g and 28.7 weeks. Infants had a mean GA at the assessment time of 30 weeks. Mean of POFRAS score was 24.4 ± 4.2. Only 10% of infants scored ≥ 30 on POFRAS. Both higher weight and higher GA were significantly correlated with higher scores on the POFRAS (p < 0.001) also with higher scores on NNS subscale (p < 0.05). There was a trend toward a significant positive correlation between scores on NNS subscale and PMA at the assessment time (p = 0.08). Unexpectedly, Infants with higher CA scored lower on behavioral organization subscale (p = 0.02). No significant correlations with the POFRAS scores were observed for 1 and 5 min Apgar scores.

Conclusions: Our results verified that birth weight and GA should continue to be considered as indicators to oral feeding readiness and NNS exercise in very premature infants.
(range 27–30) weeks and mean chronological age 12 (range 2–30) days received SE. The duration of SE was 15 min. Oxygen saturation (SaO2), heart rate, and respiratory rate (RR) were monitored during SE.

**Results:** Data were achieved from 100 episodes of SE. 85 episodes remained within normal limits physiological stability but in 15 episodes transient oxygen desaturation occurred. These desaturations happened in mean 0.15 episodes at the first seconds of SE (decreased to 80 O2Sat). Statistically, significant increases in heart rate and RR were within normal limits.

**Conclusions:** This study suggesting that SE had no adverse effects. Although the transient oxygen desaturation (decreased to 80 O2Sat) occurred at the first seconds of SE, but it was natural because of excessive biting reflux or hard reception for external things in some preterm infants. Finally, during the orogastric or nasogastric feeding program for preterm infants in hospital, SE could be enhanced swallowing skill without major physiological instability.

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**Turkish Translation and Cultural Adaptation of Modified Mann Swallowing Ability (MMASA) Test in Patients with Acute Stroke: A Validity and Reliability Study**

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**Introduction:** Clinical evaluation of the swallowing function is very important to take necessary measures in the early period. In our country, the standardization of swallowing dysfunction is a necessity and screening tests are lacking. For this purpose, the Turkish validity and reliability of the MMASA test were examined.

**Materials and Methods:** Three speech and language therapists (SLT) translated the MMASA separately. The Turkish version and Expert Opinion Forms were submitted to six SLTs. Since the Content Validity Index (CVI) calculated for each item was appropriate the translation was finalized and then translation-back translation method was applied. TR-MMASA (Turkish MMASA) test was applied to 90 patients with acute stroke. The T-MASA (Turkish-Mann Swallowing Ability) test was chosen as an external criterion and the correlation between the TR-MMASA and T-MASA tests was evaluated and also ROC analysis was performed. Cronbach’s and item-total correlations were calculated. In the test–retest method, TR-MMASA test was applied to 25 patients randomly selected from the sample 48 h after. For the inter-rater reliability method, TR-MMASA was re-applied by a different second clinician to 25 patients randomly selected from the sample.

**Results:** The CVI (80) Cronbach’s (0.70) and item-total correlation (0.34–0.80) were found to be appropriate. For convergent and discriminant validity, the test was applied and the Spearman’s correlation coefficient was examined (0.88). In both methods, reliability was calculated according to intra-class correlation coefficients (ICC = 0.92 ICC = 0.97). Sensitivity (87%), specificity (88%), positive predictive value (0.77), negative predictive value (0.93), positive likelihood ratio (7.14), and negative likelihood ratio (0.14) were found to be sufficient.

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**Abstract**

**S3**

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**Table 1.**

| Items                  | 1st SLT (mean ± SD) | 2nd SLT (mean ± SD) | Cronbach’s coefficient | ICC  |
|------------------------|--------------------|---------------------|------------------------|------|
| Alertness              | 9.92 ± 0.4         | 9.64 ± 1.11         | 0.712                  |      |
| Cooperation            | 9.64 ± 1.11        | 9.44 ± 1.44         | 0.750                  |      |
| Respiration            | 9.44 ± 1.47        | 9.36 ± 1.49         | 0.796                  |      |
| Expressive speech      | 4.04 ± 1.09        | 4.48 ± 0.96         | 0.724                  |      |
| Auditory comprehension | 9.44 ± 1.68        | 9.00 ± 2.30         | 0.898                  | 0.816|
| Dysarthria             | 4.00 ± 1.08        | 4.20 ± 1.04         | 0.941                  | 0.889|
| Saliva                 | 4.44 ± 0.91        | 4.44 ± 0.91         | 0.890                  | 0.802|
| Tongue movement        | 8.96 ± 2.00        | 8.56 ± 2.12         | 0.938                  | 0.883|
| Tongue strength        | 8.92 ± 2.37        | 8.04 ± 2.54         | 0.815                  | 0.788|
| Gag                    | 4.28 ± 1.10        | 3.36 ± 1.84         | 0.710                  | 0.710|
| Cough reflex           | 8.76 ± 2.20        | 9.00 ± 2.21         | 0.885                  | 0.793|
| Palate                 | 9.28 ± 1.81        | 9.12 ± 1.92         | 0.952                  | 0.908|
| Total                  | 90.64 ± 11.26      | 87.36 ± 14.01       | 0.977                  | 0.997|

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**Conclusions:** TR-MMASA test adapted to Turkish is a valid and reliable test that can be performed by healthcare professionals in patients with acute stroke.

**Chewing and Swallowing Training Program in Coffin-Lowry Syndrome: A Case Report**

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**Introduction:** Coffin-Lowry Syndrome (CLS) is a rare X-linked genetic syndrome. Developmental delay, mental impairment, neuropsychiatric findings, characteristic craniofacial features, upper
extremity differences, musculoskeletal and cardiovascular system problems could be seen. This study reports the chewing and swallowing disorders of a CLS patient, the results of chewing and swallowing training and long-term follow-up.

**Materials and Methods:** A boy with CLS admitted due to coughing during eating, long-lasting wheezing and sputum, and inability to intake solid food. In clinical swallowing evaluation, the Pediatric Eating Assessment Tool (PEDI-EAT-10) used to determine dysphagia symptom severity, Visual Analog Scale (VAS) to determine wheezing and sputum severity, Karaduman Chewing Performance Scale (KCPS) to define chewing performance level, Drooling Severity and Frequency Scale (DSFS) to determine drooling severity and frequency were used. The Penetration and Aspiration Scale (PAS) was used to determine penetration-aspiration severity during Videofluoroscopic Swallowing Evaluation (VFSE). 2 months of home-based chewing and swallowing training program was given to the patient and 6 months long-term follow-up was done. Results: After 2 months of training, the patient’s coughing during eating, long-lasting wheezing and sputum and inability to intake solid food were reduced. The scores related to PEDI-EAT-10, VAS, and DSFS were improved in 2 months and continued at long-term follow-up. However, no improvement was found in chewing performance level in second evaluation, there was improvement at long-term follow-up according to KCPS. In addition, no liquid aspiration was detected as a result of repeated VFSE (Table 1).

**Conclusions:** The study suggests that it is important to evaluate patients with CLS in terms of chewing and swallowing disorders. Chewing and swallowing training can be recommended to improve chewing and swallowing in CLS.

**Keywords:** Chewing and Swallowing training

### Table 1

Scores of chewing and swallowing assessment before and during training program as well as long term follow up.

|                  | Before training program | After training program (2 months) | Long term follow-up (6 months) |
|------------------|-------------------------|----------------------------------|--------------------------------|
| PEDI-EAT-10      | 14                      | 10                               | 7                              |
| Wheezing VAS score | 7                      | 2                                | 2                              |
| Sputum VAS score  | 9                      | 0                                | 0                              |
| KCPS             | 2                      | 2                                | 1                              |
| DFSS frequency    | 4                      | 2                                | 2                              |
| DFSS severity     | 4                      | 3                                | 2                              |
| PAS liquid        | 7                      | 1                                | -                              |
| PAS pudding       | 1                      | 1                                | -                              |

Knowledge, Attitudes and Practices of Speech and Language Therapists in Delivering Dysphagia-Related Health Information to Patients with Concomitant Post-Stroke Aphasia and Swallowing Difficulties

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**Background:** Limited research has been done regarding the speech therapy practices of delivering dysphagia-related health information to the patient with concomitant aphasia and swallowing difficulties. This research study aimed to identify knowledge, attitudes and current practices of speech and language therapist (SLTs) delivering dysphagia-related health information to the patient with concomitant post-stroke aphasia and swallowing difficulties.

**Method and Procedure:** A descriptive cross-sectional research approach was used. An interviewer-administered questionnaire was used to gather data from 35 speech and language therapists who have worked within stroke setting and have a caseload with post-stroke patient with communication and swallowing difficulties. Qualitative thematic analysis along with descriptive statistics was used to identify units within the questionnaire.

**Results:** 35 (100%) SLTs claimed the importance of delivering dysphagia-related health information to the patient with concomitant difficulties. 30 SLTs (85.7%) provided information in an accessible format. However, all SLTs stated to have delivered dysphagia-related health information to patients using accessible format or delivered information to the caregiver. SLTs used accessibly written information along with other methods. When implementing dysphagia-related technique verbal, written, gestural communication and pictorial methods were mainly used to deliver information. However, SLTs stated excessive caseload, limitation in time, patient’s socioeconomic level, and lack of resources as barriers to deliver dysphagia-related health information to the patient with concomitant post-stroke aphasia and swallowing difficulty. SLTs were recommended patient and caregiver directed methods and professional directed methods to overcome the above barriers.

**Conclusion:** Findings suggest a positive direction for SLT in the local context given that all SLTs reported providing accessible information.

**Adaptation of Schedule for Oral Motor Assessment to Turkish, Validity, and Reliability: Pilot Study**

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**Introduction:** Feeding and swallowing disorders may have seen in the pediatric population. It is important to evaluate the swallowing in a practical way and to make referrals. Schedule for Oral Motor Assessment (SOMA) is a suitable tool for clinical evaluation during feeding. In our country, an assessment tool is needed to be used for clinical evaluation of swallowing. For this purpose, SOMA was adapted and its validity and reliability were examined.

**Materials and Methods:** Translation-back translation method was applied and Content Validity Index (CVI) was calculated from the answers of five speech and language therapists (SLT). The tool was called “Yutmadı Oral Motor Degerlendirme Ölçeği” and applied to 50 children with cerebral palsy, Down syndrome, developmental delay, and normal development. Item difficulty and discrimination indexes were calculated. For criterion validity, Karaduman Chewing Performance Test was applied. For reliability; the internal consistency coefficient (ICC) was calculated. In the test–retest method, tool was re-applied to 15 randomly selected participants after 3 weeks; in the inter-rater reliability method, another SLT applied the tool to 10 randomly selected participant. Also, ROC analysis was applied.

**Results:** The CVI (> 0.0) was found appropriate. According to item analysis, there is no need to remove items. For criterion validity, Spearman correlation coefficient was examined \( r = 0.989, p = 0.000 \). In the test–retest method, compliance percentage (CP) and the kappa coefficient (K) were calculated \( CP > 75\% , K > 0.61 \), in the inter-rater reliability \( CP > 0.63, K > 0.63 \) in 99%. The ICC was obtained with the KR-20 value. In the ROC analysis, sensitivity (88%), specificity (90%), positive predictive value (84%), and negative predictive value (%93) of the total score were sufficient, some of the subcategories had low sensitivity.
**Conclusions:** This study is a pilot study due to low number of participants and low sensitivity.

| Internal consistency coefficient | KR-20 |
|----------------------------------|-------|
| Puree                            | 0.823 |
| Semi-solid                       | 0.845 |
| Solid                            | 0.880 |
| Cracker                          | 0.883 |
| Bottle                           | 0.913 |
| Trainer cup                      | 0.887 |
| Cup                              | 0.803 |
| Total score                      | 0.971 |

### The Effect of Higher Pulse Rates on Radiation Dose and Detection of Aspiration and Penetration in Videofluoroscopy

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**Introduction:** Videofluoroscopic swallow studies (VFSS) are typically completed at 7.5, 15, or 30 pulses per second (pps). Higher pulse rates result in more images acquired and increased temporal resolution. Literature suggests lower pulse rates result in reduced detection of aspiration events, compromising sensitivity of VFSS and potentially contributing to aspiration pneumonia.

**Materials and Methods:** 42 30pps VFSS were analyzed by a single rater using Image J to omit every 2nd and 4th frame to create duplicate footage replayed at 7.5, 15, and 30pps. Radiation doses between 2 patient cohorts were compared, with each team using different screen times and pulse rates.

**Results:** 69.1% of VFSS had penetration to the cords/asperation observed on 7.5, 15 and 30pps. 21.4% showed penetration to the cords on 15pps but not 7.5pps. For 9.5%, 30pps was required to detect penetration that was not visualized with 15 or 7.5pps. The team using higher pulse rates had a lower dose area product imparted to patients than the team using higher pulse rates due to optimized techniques to reduce screening time.

**Conclusion:** Higher pulse rates in VFSS result in improved detection of thin fluid penetration to the vocal folds. Radiation doses typically increase with higher pulse rates; however, careful protocols to optimize screen time and radiation doses were successful in minimizing this risk.

### Neonatal Dysphagia: A Case-Based Survey of Speech Language Pathologists’ Practice Pattern in India

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Currently, there are no available estimates on the prevalence of dysphagia among premature neonates in India. It is more likely that the prevalence rates in India to be higher than that of western reports [1] as India stands first among ten countries with the highest number of preterm births [2]. Unlike adults with dysphagia, for whom research has revealed best practices in the evaluation and treatment, research is limited for the neonate population. Most practice is based on anecdotal evidence and expert opinion [3]. The purpose of this research study was to identify practice patterns of speech-language pathologists in India toward assessment and management of neonatal dysphagia in the NICU. A total of 35 individuals, seven expert academician/ researchers, working in the area of pediatric dysphagia, and 28 practicing clinicians who work with this population were initially identified and contacted for participation in the survey. A 30 item electronic survey which included questions on education, work setting, NICU dysphagia experience, and two hypothetical case scenarios was sent to all the participants through a direct email request. The results revealed varied practice patterns within and between groups in the clinical swallowing assessment, referral for instrumental swallowing evaluations, and management approaches for feeding and swallowing disorders in neonates. The findings from this study suggest a need for a uniform framework, which may provide a common context for establishing a standardized language for describing and studying health and health-related domains, developing and evaluating outcomes for interventions, predict healthcare delivery needs, and influence policies and allocation of essential resources toward the area of neonatal dysphagia. Translation of current evidence-based research into clinical practice is critical to patient care.

### The Desi Dysphagia Diet: A Pilot Implementation Study of the IDDSI Framework at A University Teaching Hospital in India

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The IDDSI framework has been the foundation in diet modification and has been implemented successfully across several countries. However, the uniform implementation of the IDDSI framework is yet to take its full form in India. There are no existing national terminologies or standardized structure for texture-modified foods and thickened liquids. The present study intends to embark on a premier pilot project to test the feasibility and implementation logistics of the IDDSI framework at a university teaching hospital in the Indian context. A university teaching hospital in India was identified, which served as a pilot test site to put the IDDSI framework into operation. The pilot implementation study was carried out in following stages: 1) Formation of the multidisciplinary team, 2) Training of team members, 3) Framework planning, 4) Review of existing hospital food services, 5) Mapping of existing hospital food services to IDDSI framework, 6) Implementation and review. The process commenced...
from the general inpatient ward, with findings to inform roll-out to other wards and eventually other hospitals within the University healthcare network. After initial review, 46 existing food from the hospital food catalog were identified and were categorized according to the ISSDI levels. Recommendations were made in terms of staff education, enhanced communication, and review of existing menu items to determine which ones met IDDSI framework qualifiers. The IDDSI standardized labels, colors, and numbers were introduced to help staff quickly identify patients who require texture-modified food and/or thickened liquids. A combination of organizational support, in addition to collaborative work from key stakeholders spanning food service, medicine, nursing, speech pathology, and dietetics, was important to the success of the implementation process. The future directive is to replicate the pilot project across 5 other hospitals within the university hospitals network.

Reliability of Swallow Detection Using A Combined SEMG/BI Device in Healthy Adults—A Pilot Study

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Introduction: Reliable detection of swallow events is an important aspect in clinical dysphagia diagnosis and management. It is suggested, that a non-invasive measurement technique based on surface electromyography (sEMG) and bioimpedance (BI) might be able to detect swallow events. Aim of this pilot study was to investigate the reliability of swallow detection of a SEMG/BI device compared to Fiberoptic Endoscopic Evaluation of Swallowing (FEES) as a reference standard.

Methods: Five healthy participants (4 females/1 male; mean age: 32.6 years, range 25–51 years) were examined simultaneously with the SEMG/BI device and FEES. They performed a swallow protocol of different consistencies (saliva, liquid, pudding, solid) and a breath hold task with 5 trials each in a randomized order. Detected swallow events, not detected swallow events and false positive events were identified with reference to the White-Out during FEES. The reliability of swallowing detection was calculated.

Results: Overall, 67% of the swallows were recognized by the SEMG/BI device. Holding the breath was detected as swallow event in 8% of the cases. No differences of reliability could be identified concerning the different tested consistencies.

Conclusions: The results of this pilot study show that detection of swallow events was not highly reliable compared to the reference standard FEES. Electrode placement might have had an impact on reliability and should be examined further. Furthermore, reliability of swallowing detection of this SEMG/BI device should be investigated further with a larger group and as well with patient populations. Clinicians should be aware of not making decisions solely based on this technique.

Delayed Development of Feeding Skills are “Red Flags” for Organic Pathology

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Introduction: Feeding and swallowing problems in children often have multifactorial causes including organic, respiratory, neurobiological, and behavioral issues. The aim of this study is to investigate the feeding history of the first two years of life in healthy children and children with gastrointestinal diseases in order to identify possible clinical indicators of digestive system pathology.

Material and Methods: Retrospective case–control study design. The samples consisted of 787 healthy participants and 141 children with gastrointestinal diseases. All aged up to 7 years. Parents were asked to provide data on demographics and describe feeding history by answering to 28 and 11 closed-ended questions, respectively.

Results: In a multivariate analysis addressing transitions to certain food textures and feeding skills—after controlling for demographics—, it was found that significantly fewer children with a gastrointestinal disease had achieved self-feeding through finger foods (p < 0.05) and use of cup for drinking (p < 0.05) by the age of 24 months compared to the healthy group. Concerning transitions (pureed, solids), inability of weaning to solids by the age of 18 months was found to be indicative of a digestive pathology although this association marginally rendered non-significant after controlling for demographics.

Discussion/Conclusion: The study showed that feeding problems during the first two years of life can be a reflection of a gastrointestinal disease and provides a list of feeding behaviors that may be manifestation of an underlying digestive system pathology. During evaluation of a child with a feeding problem, clinicians must include a search of red flags that suggest the presence of an organic pathology.

Abstracts with Session Assigned

*Poster of Merit*: Effects of Lee Silverman Voice Treatment (LSVT® LOUD) on Swallowing and Speech in Patients with Progressive Supranuclear Palsy

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Introduction: Progressive supranuclear palsy (PSP) has features of parkinsonism, a tendency for easy falling, supranuclear gaze palsy, and dementia. The eating and swallowing disorder of PSP resembles that of Parkinson’s disease (PD), but it occurs earlier than in PD and rapidly becomes severe. The cause of death is often aspiration pneumonia or asphyxiation due to accumulation of sputum. Lee Silverman Voice Treatment (LSVT LOUD; LSVT) focuses on a simple set of tasks designed to maximize phonation. There is Level 1 evidence for the use of LSVT for speech and voice treatment in early-stage PD. Some reports have described the effects of LSVT for dysphagia in PD, but there are few reports about PSP.

Purpose: The purpose of this study was to evaluate whether LSVT can improve swallowing and speech in PSP patients.

Materials and Methods: The LSVT program was administered to 7 PSP patients: age, 59–92 years; disease duration, 2–10 years; and modified Rankin Scale score, 2–5 (5 wheelchair users, and 2 walked with assistance). The patients received LSVT four times a week for 4 weeks from an LSVT-certified speech–language–hearing therapist (SLHT) and performed self-training for 15 min every day. Before and after the 4-week therapy period, swallowing function was evaluated by videofluoroscopy (VF), speech intelligibility was evaluated by four SLHTs using a 5-point rating scale (Jpn. J. Logop. Phoniatr. 32:347–353, 1991; from 1 = not intelligible to 5 = not intelligible), and voice characteristics were analyzed using Praat (speech analysis software). Respiratory function was measured in 5 patients.
The Motor Rehabilitation is Associated with Serum Albumin and Oral Intake of Foods but the Cognition Rehabilitation is not in the Patients with Cerebral Hemorrhage

Session Title: Eposter Session A: Dysphagia in Geriatrics/Neurodegenerative/Stroke

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Introduction: The effects of rehabilitation are usually assessed by Functional Independence Measure (FIM). The sequelae of stroke are divided into motor and cognitive disturbances. The association of nutritional status including the manner of foods intake with the rehabilitation on motor and cognition disturbances was investigated.

Materials and Methods: Forty-one patients with cerebral hemorrhage were subjected (mean age 72±13 years). Rehabilitation was performed for 27 to 187 days. FIM is consisted of fifteen items reflecting motor assessment (Motor FIM) and eight items, reflecting cognition assessment (Cog FIM). The manner of nutritional intake is evaluated by Functional Oral Intake Scale (FOIS). FOIS is classified into seven scales. FOIS 1 to 3 are tube dependent and 4 to 7 are total oral intake. The association of FIM with serum albumin and FOIS was investigated. The analysis was performed using FIM gain. FIM gain is the FIM difference between the discharge and admission.

Results: Motor FIM gain was associated with albumin at discharge (R = 0.3978, p = 0.0100), but not with albumin at admission (R = 0.2384, p = 0.133), meanwhile Cog FIM gain was not associated with albumin at admission (R = 0.030, p = 0.852), or at discharge (R = 0.117, p = 0.456) either. In the analysis of correlation between FIM and FOIS, Motor FIM gain was 3.537.14 in the group of which FOIS at discharge was 1–3 (Group A) and 25.3617.92 in the group of which FOIS at discharge was 4–7 (Group B) (p = 7.19 × 10–5). On the other hand, Cog FIM gain was 3.305.82 in Group A and 5.684.02 in Group B (p = 0.068). Motor FIM is strongly associated with oral intake but Cog FIM is not associated with the manner of food intake.

Conclusion: Serum albumin and oral intake of foods are strongly associated with the recovery of motor deficits after rehabilitation. Then we should ameliorate nutritional status to these patients with cerebral hemorrhage. For cognitive impairments, the proper psychosocial intervention is required.

Investigating the Dosages and Effect of Swallowing Exercises in Stroke Rehabilitation: A Systematic Review and Meta-Analysis

Session Title: Eposter Session A: Dysphagia in Geriatrics/Neurodegenerative/Stroke

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Introduction: Stroke is a common cause of acquired dysphagia. Exercises can rehabilitate swallowing, but little is known about the optimal exercise dosage and their effect. This review investigated the dosages and effect of swallowing exercises in stroke rehabilitation studies.

Methods: We conducted a search using MEDLINE, Embase, CINAHL, Web of Science, and SpeechBITE until May 2019 with reference tracing. Studies were included if adults with post-stroke dysphagia received rehabilitative swallowing exercises and pre/post outcomes were reported. Two reviewers independently screened studies and rated quality as per the PRISMA statement. Meta-analysis was conducted by pooling Hedges’ g effect sizes of similar studies.

Results: 3351 studies were retrieved and 139 met inclusion criteria. However, only 39 studies described the swallowing exercises and their dosages in detail and were included for review. Seventeen different swallowing exercises were described in included studies. Results indicated poor reporting and significant heterogeneity of the dosages of exercises. In particular, there was variation in the dosages and exercises used in “traditional dysphagia therapy” control groups. Meta-analysis showed large effects of Shaker head lift and expiratory muscle strength training (EMST), and a medium effect of chin tuck against resistance (CTAR) on swallowing function. “Traditional dysphagia therapy” provided no effect on swallowing function. Further research is needed to guide consideration and prescription of swallowing exercise dosages.

*Poster of Merit*: Characterizing Swallowing-Related Quality of Life in People with Parkinson’s Disease and Dysphagia

Session Title: Eposter Session A: Dysphagia in Geriatrics/Neurodegenerative/Stroke

Perry, S; Troche, M

Teachers College Columbia University

Introduction: Dysphagia is highly prevalent in people with Parkinson’s disease (PwPD), leading to serious consequences like depression, anxiety, and reduced quality of life (QOL). Previous investigations of swallowing-related QOL have not included swallowing pathophysiology using instrumentation. It is unknown whether swallowing-related QOL in PD is specifically linked to physiologic impairments of swallowing. The purpose of this study was two-fold: 1) to determine the influence of swallowing-specific outcomes on swallowing-related QOL in PwPD; 2) to determine the influence of disease-specific variables on swallowing-related QOL in PwPD.

Methods: Adults with idiopathic PD (n = 90, age = 41–86 y; 26 females) ranging from mild to severe disease reported swallowing-related QOL (SWAL-QOL) and underwent flexible endoscopic evaluations of swallowing, and screenings of cognition and functional swallowing. Swallowing outcomes included: airway invasion, vallecular and pyriform sinus residue, and time taken to ingest a cracker. Disease-specific outcomes were as follows: cognition, and disease severity/duration. Descriptive and regression analyses were completed.
The Association Between Specific Dysphagia Symptoms and Caregiver Burden in People with Parkinson’s Disease

Session Title: Eposter Session A: Dysphagia in Geriatrics/Neurodegenerative/Stroke

Perry, S; Troche, M
Teachers College Columbia University

Introduction: Dysphagia is common among people with Parkinson’s disease (PD), often necessitating mealtime assistance or special preparation. Caring for a family member with dysphagia has been found to negatively impact caregiver well-being, although past research has relied on patient self-report to diagnose dysphagia and little is known about the effects of dysphagia severity on caregiver well-being. The purpose of this study was to quantify swallowing outcomes objectively and measure the association with caregiver burden in the context of PD.

Methods: Fifty caregivers of adults with idiopathic PD completed a caregiver burden survey. Results were compared to flexible endoscopic evaluations of swallowing from partners/spouses with PD ranging from mild to severe disease. Outcomes included the following: caregiver burden score, airway invasion, vallecular and pyriform sinus residue, PD severity, and duration. Descriptive and regression analyses were completed.

Results: All caregivers reported experiencing some caregiver burden, with 30% categorized as severely disadapted. Together, sex, disease severity, and disease duration significantly influenced caregiver burden [F(3, 16) = 9.64, R² = 0.69, p = 0.001], with male caregivers, earlier and less severe disease each being independently predictive of caregiver burden. All of the ratings of moderate or severe disadaptation were from caregivers whose partners/spouses demonstrated airway invasion and pharyngeal residue, however, the relationships between airway invasion and residue ratings to caregiver burden were non-significant. Discussion: Findings confirmed that caregivers of people with PD and dysphagia experience caregiver burden, particularly in the early stages of the disease. Clinicians can use this information to facilitate the earlier identification of caregivers at risk of burden, or to design and implement appropriate support systems to prevent the development of caregiver burden in patients with dysphagia.

Effects of Parkinson’s Disease on Cough Function: A Retrospective Observational Study

Session Title: Eposter Session A: Dysphagia in Geriatrics/Neurodegenerative/Stroke

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Introduction: Voluntary cough strength and effectiveness of reflexive cough play an important role in secretion clearance and airway protection. Impaired cough function is common in Parkinson’s Disease (PD). This study aimed to explore cough parameters affected in PD and to determine the influence of disease severity on function.

Methods: People with PD and age-matched healthy controls were compared in this study. Cough data were acquired through spirometric study using Voluntary Cough (VC) and Reflexive Cough (RC) tasks. All participants completed Parkinson’s Disease Questionnaire-8 (PDQ-8), and Eating Assessment Tool-10 (EAT-10). Aerodynamic cough airflow measures were acquired by Labchart software and analyzed by trained clinicians.

Results: Data acquired from 47 subjects (31 males) with PD (mean; age: 69.1 years, years of diagnosis: 5.4, PDQ-8 score: 23.4 and EAT-10 score: 4.7) and 40 healthy adults (10 males) (mean age of 68.6; EAT-10 score: 0.4) were analyzed. There were significant differences (p < 0.05) in all four VC measures: Compression Phase Duration (CPD)**, Peak Expiratory Flow Rate (PEFR)**, Peak Expiratory Flow Rise Time (PEFRT)** and Compression Volume Acceleration (CVA)* between PD and control group. None of the RC measures were significantly different between groups. More than 25% of PD group had abnormal scores (> 1SD) in CPD and PEFRT measures of VC task and PEFR and CVA measures of RC task. Disease severity was negatively associated with the CPD and linear positive association was shown with PEFR, PEFRT, and CVA of the VC tasks. VC PEFRT was significantly correlated R = 0.299* with PDQ-8 scores.

Conclusion: This study suggests that motor components of the cough are affected in PD sufferers and that cough impairment correlated with overall self-reported PD symptom severity. Changes affect cough strength and may lead to poor clearance of secretions and aspirated materials leading to increased risk of pulmonary infection.

Deteriorating Parkinson’s Swallow Characteristics: A Retrospective Cross-Sectional Study

Session Title: Eposter Session A: Dysphagia in Geriatrics/Neurodegenerative/Stroke

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Introduction: Swallowing difficulties are common in people with Parkinson’s Disease (PD) and aspiration pneumonia is reported to be one of the leading causes of death. This study aimed to describe swallow parameters associated with compromised swallow safety among people with PD.
Methods: 25 people with PD and 54 age and gender-matched healthy adults were retrieved from the university database. Videofluoroscopic swallowing study was performed with each participant. Each participant’s 20 ml bolus swallows were analyzed using ‘Swallowtail’ software (Belldev Medical Ltd) by two experienced clinicians. Each swallow was rated using the penetration-aspiration scale (PAS). Quantitative swallow parameters were measured based on Leonard and Kendall’s (2008) protocol. All participants completed Parkinson’s Disease Questionnaire-8 (PDQ-8) and Eating Assessment Tool-10 (EAT-10).

Results: PD group mean age was 69.0 years (mean; years of diagnosis: 7.2, PDQ-8: 29.7, EAT-10: 6.2) and controls mean age was 67.5 (EAT-10: 0.4). All PD participants demonstrated PAS score 3 or less (all controls had PAS < 1). Comparison between PD and controls showed significant difference (p < 0.05) in timing measures; oral, hypo-, total pharyngeal transit time (OPT, HPT, TPT), pharyngeal opening duration (PESdur)** and displacement measures; maximal opening of the PES (PESmax)** and pharyngeal constriction ratio (PCR)**. Increased disease severity was associated with worsening OPT, HPT, TPT, airway opening duration, PESdur, maximum hyoid displacement duration, maximal opening of the PES (PESmax), maximum hyoid displacement (HMax), hyolaryngeal displacement, and PCR measures. HMax was significantly correlated Rs = − 0.513* with PDQ-8 scores. More than 25% of PD participants had abnormal scores (> 1SD) in the PESdur, PESmax, and HMax measures.

Conclusion: Although participants did not have significant safety compromise according to PAS scores, findings reveal deterioration in pharyngolaryngeal function in PD sufferers which was associated with overall self-reported PD symptom severity. These data may support the development of tailored interventions that optimize safe swallowing and decrease the probability of aspiration pneumonia.

Investigation of the Association of Swallowing Function and Feeding Skills in Nursing Home Residents

Session Title: Eposter Session A: Dysphagia in Geriatrics/Neurodegenerative/Stroke

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The Chinese University of Hong Kong

Introduction: Swallowing and feeding problems are common in older adults, particularly in those living in nursing homes. Serious complications, such as aspiration pneumonia and death, result from each of the problem or a combined effect of both. However, the relationship between swallowing function and feeding skills was largely unclear. The associated factors of feeding problems in nursing home residents were also insufficiently documented in the literature.

Materials and Methods: The association between swallowing function and feeding skills was investigated with the use of standardized assessment tools—The Mann Assessment of Swallowing Ability (MASA) and The McGill Ingestive Skills Assessment (MISA). Seventy-three participants from nursing homes consented to a naturalistic mealtime observation using MISA. The medical records of participants were accessed to obtain a recent MASA score and related medical history, to determine the associated factors of feeding problem.

Results: The MASA and MISA scores had a weak, positive correlation which was statistically significant. Two of the subscales (feeding skills, solids ingestion) had a moderate and positive correlation with MASA scores. Dementia and mobility status were found to be associated factors with the MISA scores, hence feeding abilities. Discussion: Results suggested that swallowing and feeding are associated but the association is not strong. Feeding skills and performance on solid ingestion were more associated with swallowing function. The findings from this study advocate for the inclusion of both swallowing and feeding in managing dysphagia in older adults living in nursing homes. Clinicians should also be more alert to the potential of feeding difficulties in patients who have dementia or those who are non-ambulatory.

Poster of Merit**: Effect of Tongue Progressive Resistance Exercise in the Elderly Presbyphagia: Randomized-Controlled Trial

Session Title: Eposter Session A: Dysphagia in Geriatrics/Neurodegenerative/Stroke

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Introduction: Reduced tongue strength is an important factor contributing to presbyphagia and tongue-strengthening exercises can improve swallowing function in elderly people. Various exercise methods have been developed but it is unclear which method is the best. We tried to find out the effects of a new progressive resistance exercise in the elderly by comparing conventional isometric tongue-strengthening exercise.

Materials and Methods: Twenty-nine elderly volunteers were randomly divided into two groups. One group (G1, progressive resistance exercise group) performed a forceful swallow of 2 mL of water every 10 s for 20 min with a total of 120 swallow tasks per day at 80% angle of maximum head extension. The other group (G2, isometric exercise group) performed 24 sets of five repetitions with 30-s rest with the target level set at 80% of one-repetition maximum using the Iowa Oral Performance Instrument (IOP1) per day. A total of 12 sessions in four weeks were performed in both groups. Blinded lingual strength measures (for maximum lingual isometric pressure and peak pressure during swallowing) were obtained using IOP1 before training and at four weeks after training for both groups.

Results: After four weeks of training, measures of tongue strength in both isometric and swallowing tasks were increased significantly in both groups. However, it was shown that there was no significant difference in the strength increment of both tasks between groups. Conclusions: Regardless of the type, tongue-strengthening exercises had good effects in improving lingual pressure in the elderly with equal superiority.

Poster of Merit**: Using Clinical Data to Develop an Online Prognostic Tool for Decannulation in Patients with Acquired Brain Injury

Session Title: Eposter Session B: Dysphagia in Respiratory Diseases/Stroke and Brain Damage

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Introduction: Clinicians are often required to provide a qualified guess on the probability of decannulation, in estimating subjects’ rehabilitation potential and relaying information about prognosis to subjects and next of kin. The objective of this study was to use routinely gathered clinical data to develop a prognostic model for time to decannulation in subjects with acquired brain injury, for direct implementation in clinical practice.
Materials and Methods: Data from a large cohort including 574 tracheostomized subjects admitted for neurorehabilitation were analyzed using discrete time to event analysis with logit-link. Within this model, a reference hazard-function was analyzed using restricted cubic splines, and estimates were presented using odds ratios (95% CIs).

Results: A total of 411 subjects (72%) were decannulated during a median of 27 days (IQR 16–49) at the rehabilitation hospital. The prognostic model for decannulation included age, diagnosis, days from injury until admission for rehabilitation, swallowing- and overall functional level measured with the Early Functional Abilities score. Among these, the strongest predictors of decannulation were age and a combination of overall functional abilities combined with swallowing ability.

Conclusions: A prognostic model for decannulation was developed, using routinely gathered clinical data. Based on the model, an online graphical user interface was applied, in which the probability of decannulation in x days is calculated along with the statistical uncertainty of the probability. Furthermore, a layman’s interpretation is provided. The online tool was directly implemented in clinical practice at the rehabilitation hospital to assist clinical decision making and informing subjects and next of kin about prognosis for decannulation.

Multidisciplinary Weaning Protocol Developed as Best Practice

Session Title: Eposter Session B: Dysphagia in Respiratory Diseases/Stroke and Brain Damage

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Introduction: Patients with severe dysphagia are at risk of aspiration and therefore often in need of a cuffed tracheostomy tube. Preliminary research results indicate that a multidisciplinary team effort results in faster weaning within complex neurorehabilitation settings. However, the multidisciplinary approach is not well recognized. The main goal is a safe and fast weaning from the tracheostomy tube through hospital-based rehabilitation. Rehabilitating a patient with a cuffed tracheostomy tube is a very complex task. Health professionals must evaluate daily to make sure that the patient is challenged in accordance with his/her functional level. Shared professional competencies are very important in the weaning process. The nursing staff needs to know how to handle and care for patients with tracheostomy tubes, and the therapeutic approach with graduated stimulation is of equal importance. There is a limited amount of evidence and literature on neurological patients with a tracheostomy tube, and there is no standardized evidence-based multidisciplinary protocol for weaning from a tracheostomy tube. There is a consensus in research results that the need for systematic and individually adjusted weaning protocol is needed.

Materials and Methods: Through many years of specialized treatment, an expert practice level was accomplished. To support evidence-based decision making a systematic search of research literature was performed. An algorithm was developed to standardize the weaning process. The algorithm was systematically integrated in daily practice routines.

Conclusion: We have developed a weaning manual, an action-oriented document. This constitutes a foundation for weaning. The weaning manual is based on research results and best practice, which builds on many years of multidisciplinary experience on neurorehabilitation patients with cuffed tracheostomy tubes.

Neuromuscular Electrical Stimulation Plus Intensive Exercise Against Resistance (AMPCARE ESP) in the Treatment of Post-Stroke Dysphagia: Further Evidence for Positive Outcomes

Session Title: Eposter Session B: Dysphagia in Respiratory Diseases/Stroke and Brain Damage

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Introduction: Dysphagia is a common and debilitating consequence of stroke. Alongside traditional exercises, strategies, and diet and fluid modification, neuromuscular electrical stimulation (NMES) is increasingly used in an attempt to reduce the impairment, increase the amount and variety of safe oral intake, and improve quality of life for stroke survivors. Evidence for the use of NMES in the treatment of post-stroke dysphagia is growing, but remains limited in quantity. Outcome data are collected when the therapy is used in the UK to increase understanding about whether, and for whom, it may be beneficial. The Ampcare effective swallow protocol (ESP) is a therapy program which combines NMES with exercise against resistance. Data are presented to demonstrate that a large proportion of stroke survivors with dysphagia who complete the therapy experience positive outcomes.

Material and Methods: Data were collated from 26 stroke patients over 6 NHS trusts in the UK. Patients were offered up to 22 sessions of Ampcare ESP, completing swallowing exercises against resistance while electrical stimulation was applied to the suprathyroid muscles. Functional oral intake scale (FOIS) was the primary outcome measure.

Results: Of the 26 patients who consented to Ampcare ESP, 3 passed away and one became medically unwell. Of the remaining 22 patients, 19 (86%) showed an improvement in the amount and/or variety of food they were eating, as shown by an increase in FOIS. 11 patients were nil by mouth at the outset of the therapy program; 10 of these were able to safely introduce oral intake upon completion of therapy. 9 of the 20 patients who were tube dependent before therapy were able to meet their needs orally after completing therapy.

Conclusions: These clinical data provide further support for the use of Ampcare ESP in the treatment of post-stroke dysphagia. Future research should involve a full evaluation of the health and financial costs and benefits resulting from the therapy.

Feasibility and Reliability of the Sydney Swallow Questionnaire During the Subacute Stage of Stroke

Session Title: Eposter Session B: Dysphagia in Respiratory Diseases/Stroke and Brain Damage

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Introduction: Oropharyngeal dysphagia (OD) is a common complication following stroke. It is associated with increased risks of comorbidities and mortality. The Sydney Swallow Questionnaire (SSQ) is a self-reported questionnaire specifically designed to detect OD. Several studies have demonstrated its validity and reliability to...
detect oropharyngeal dysphagia in a range of different populations. The aim of this study was to assess the feasibility and reliability of the SSQ on a sample of stroke patients in subacute stage.

**Materials and Methods:** Twenty-two patients with subacute stroke (between 15 days and 6 months after stroke) were recruited. Each subject completed the SSQ and underwent a clinical swallowing assessment. Moreover, patients completed two questionnaires related to cognitive impairments and anxiety and depression symptoms (Montreal Cognitive Assessment (MoCA) and Hospital Anxiety and Depression Scale (HADS), respectively) that could be used as explanatory variables for our primary outcomes. The medical records and characteristics linked to the stroke were also collected retrospectively.

**Results:** The SSQ total score was strongly correlated with the results of the clinical evaluation of swallowing ($r = 0.57$; $p = 0.005$). No significant correlation was found between the SSQ total score and the anxiety (A) or depression (D) or the cognitive impairments questionnaires (HADS_A, $r = 0.27$; $p = 0.211$; HADS_D, $r = 0.33$, $p = 0.132$; MoCA, $r = -0.26$, $p = 0.236$). Finally, we observed no significant effect of stroke characteristics and deficits on the SSQ total score ($r > 0.005$).

**Conclusion:** The SSQ is a feasible and reliable instrument to measure and detect oropharyngeal dysphagia during the subacute stage of stroke and could be used in a clinical setting. Further studies are needed to assess how it should help in the rehabilitation of those patients.

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**Poster of Merit**: Relationship Between Dysphagia Severity and Head and Neck Proprioception in Patients with Neurogenic Dysphagia

**Session Title:** Eposter Session B: Dysphagia in Respiratory Diseases/Stroke and Brain Damage

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Introduction Proprioception is the sense of position and movements of our body. Swallowing function requires a series of movements for moving the food from the mouth to stomach. Therefore, proprioception could be important for proper swallowing function. This preliminary study was aimed to investigate the relationship between dysphagia severity and head and neck proprioception in patients with neurogenic dysphagia.

**Materials and Methods:** The study included 26 patients with neurological disorders who underwent a Modified Barium Swallowing Assessment. The penetration–aspiration scale (PAS) was used to determine penetration–aspiration severity. Head and neck range of motion (ROM) evaluation was performed in all directions of neck movements including neck flexion, extension, right rotation, and left rotation with goniometer. Head and neck proprioception was measured with Laser Pen Headband in all directions. Measurements were determined as the amount of deviation from the center point in cm.

**Results:** The mean age was 52.50 ± 10.84 years. No difference was found in terms of ROM between groups ($p > 0.05$). A significant correlation was found between PAS scores and proprioception measurements related to head and neck flexion, extension and left rotation ($r = 0.48$, $r = 0.58$, $r = 0.42$; $p < 0.05$, respectively). The patients were divided into patients with aspiration ($n = 13$) and without aspiration ($n = 13$). There was difference in terms of proprioception measurements related to head and neck flexion, extension, and right rotation between groups ($p < 0.05$). The amount of deviation in neck flexion, extension and right rotation in patients with aspiration was more than patients without aspiration.

**Conclusions:** Swallowing function is defined as a sensory motor function. Results regarding differences in proprioception among groups indicated that proprioception may have an important role in swallowing function. This preliminary study suggests that proprioception should be considered in dysphagia management.

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**Poster of Merit**: Swallowing and Quality of Life in the Elderly in the Late Phase of Stroke

**Session Title:** Eposter Session B: Dysphagia in Respiratory Diseases/Stroke and Brain Damage

**Cárdenas, J; Oliveira, L; Mitutui, C; Rosa, R; Andrade, E; Berretín-Felix, G**

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**Introduction:** There are a lot of researches regarding acute stroke and quality of life, so there is a need to understand whether quality of life can help the signs and symptoms of dysphagia in patients affected by...
In a prospective study, patients with compromised in patients with acute brain damage, conditioning oral feeding. The aims of this study are to document an improvement of swallowing and NPS disorders were evaluated during 2004 and 2005, as pudding were tested. The degree of dysphagia was classified from mnesic abilities. Not all patients with NPS alterations had a documented pre/post-treatment reduction of the p-score. Conclusions: In patients with subacute brain damage, NPS and swallowing disorders are frequently coexisting. Specific therapeutic approaches improve these impairments without a documented correlation between them. Further research is in progress to explore this correlation.

**Neuropsychological and Swallowing Disorders in Subacute Brain Damaged Patients**

**Session Title: Eposter Session B: Dysphagia in Respiratory Diseases/Stroke and Brain Damage**

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**Introduction:** Neuropsychological (NPS) abilities are frequently compromised in patients with acute brain damage, conditioning oral feeding. The aims of this study are to document an improvement of swallowing and NPS abilities after treatment and a possible correlation between them.

**Materials and Methods:** In a prospective study, patients with swallowing and NPS disorders were evaluated during 2004 and 2005, after admission to a Rehabilitation Center carried out not earlier than 14 days after acute brain damage. All the patients underwent an endoscopic evaluation of swallowing (FEES) to determine the severity of dysphagia, by applying p-score and the p-SCA. Attentive, mnesic, perceptive, executive, intellective, and linguistic functions were also assessed, using standardized paper-pen and/or PC protocols. Patients underwent a daily swallowing therapy (meal surveillance, dietary adaptations, direct therapy, and indirect therapy) and NPS therapy. After 60 days, all the patients were re-evaluated.

**Results:** A sample of 235 consecutive inpatients (mean age 59.8 ± 17.8, range 19/78; 148 M/87F) was considered: all underwent swallowing therapy and 98 underwent NPS therapy. The p-score and the p-SCA score and all the NPS abilities were significantly reduced after 60 days. Patients with a p-score > 8 documented a correlation with attention; a p-SCA > 9 documented a correlation with attention.

**Speech and Language Therapy Service Outcomes for Patients who were Admitted to Royal Papworth Hospital Foundation Trust Intensive Care Unit for Covid-19 During March to May 2020**

**Session Title: Eposter Session B: Dysphagia in Respiratory Diseases/Stroke and Brain Damage**

Mossey-Gaston, C

Royal Papworth Hospital NHS Trust

During March to May 2020, 39 patients with COVID-19 were admitted to Royal Papworth Hospital Foundation Trust received Speech and Language Therapy input. These patients spent extended stays on intensive care; the shortest stay being 9 days up to the longest stay being 73 days at the time of the data collection. 9 patients were being treated with extra corporeal membrane oxygenation (ECMO). Despite the severity of patients being treated: 12 patients were discharged home, 19 recovered sufficiently to be transferred to their local hospitals, 7 remained at Royal Papworth and 1 died. These figures are significantly lower than the survival rate of 50.1% across the UK (Intensive Care National Audit & Research Centre 04/2020). During the initial phase, dysphonia was observed in 95% of patients. On instrumental assessment, 88% of patients had reduced hyolaryngeal movement. 61.7% were severely dysarthric. 61.6% were nil by mouth with 5% were able to maintain their needs orally. On discharge, patients had improved, but continued to need speech and language therapy input. 59% had a residual dysphonia. Dysphagia severity had reduced, but 18.8% were nil by mouth with 53% were on a normal or slightly modified diet. The role of speech and language therapy, within the multidisciplinary team, is important in providing early identification of silent aspiration risk and support during the ventilation weaning process. It is also important for patients to continue to receive speech and language therapy input both in general hospitals and the community.

**Safety Issues of Oral Methylene Blue in Swallowing Assessment: A Systematic Review**

**Session Title: Eposter Session C: Instrumental Assessment and Dysphagia Diagnosis**

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**Introduction:** Methylene blue (MB) is a medication and dye often applied during fiberoptic endoscopic evaluation of swallowing (FEES) to enhance visualization of pharyngeal bolus transit. However, safety issues of MB are pending since serious adverse events (AEs) due to MB administration have been reported. MB can cause

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*Abstract*
necrosis of skin/fat tissue, hemodynamic instability, hemolytic anemia, serotonin syndrome, and even death. The aim of the current study is a systematic analysis of the literature to obtain an evidence-based overview of the indications and safety of the oral administration of MB in particular during swallowing assessment. **Methods:** A systematic literature search was carried out in PubMed, Embase, and Cochrane Library. Two reviewers independently selected articles describing the oral administration of MB as main diagnostic or therapeutic intervention, MB dosage, and AEs. Expert opinions, conference papers, sample size < 10, and animal studies were excluded. The level of evidence of the included studies was determined. **Results:** A total of 2264 unduplicated articles were obtained. Seventeen studies met the inclusion criteria with 100% agreement between the two reviewers. Twelve studies were randomized controlled trials. In a pooled population of 2797 patients, nine serious AEs were reported of which two were related to oral administration of MB. Non-serious AEs showed a dose-related trend and were mostly mild and self-limiting. A meta-analysis could not be performed because the included studies were of insufficient methodological quality and the heterogeneous study designs made comparability and statistical pooling impossible. **Conclusion:** Serious AEs due to oral administration of MB are exceedingly rare. There was no evidence that a few drops of orally administered MB might be unsafe during a FEES examination. **How to Look for Articles Related to Instrumental Assessment of Oropharyngeal Dysphagia in Pubmed**

**Session Title:** Eposter Session C: Instrumental Assessment and Dysphagia Diagnosis

**Vieira, D**1; **Sousa, E**2; **Monteiro, E**3; **Dinis-Ribeiro, M**4

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**Introduction:** Deglutition is a sensorimotor act that allows food and liquids transport from the lips to the stomach, in a sophisticated biomechanical interaction, in a safe and efficient mode. The study of this orofacial function is crucial to based research in objective measures. For that, we can use videofluoroscopy or fiberoptic endoscopy, as the gold standard examinations. But when we search articles or publications related to these topics, what are the most suitable MeSH terms to use? If we look for the key words, titles, or abstracts we can see that are used different labels for those exams. So, with this paper, we intend to describe the most suitable MeSH term to research about deglutition and its disorders and the gold standard exams for it. **Materials and Methods:** Two independent researchers using PubMed database performed this work. Based on PICO strategy, we search articles related to deglutition or deglutition disorders. After that, we search and compile the MeSH terms used to index those articles. Results. From the index MeSH terms of the articles, we made a register and compilation of all of them. In the end, for searching articles related to videofluoroscopy, we recommend to used terms like fluoroscopy, barium, barium sulfate, and contrast media. For endoscopy: endoscopy or fiberoptic technology. For both topics, the first ones are the more stronger, and used when the objective is to look for major topics. For instance, for a theme about the way to do the exam, we can use fluoroscopy/instrumentation, as a major topic. For endoscopy and about the physiology of deglutition, we can use endoscopy/physiology. In both, we should use MeSH terms associated with deglutition, like: deglutition, or deglutition disorders. **Discussion/Conclusion:** In the end of this work, it’s simpler to search in PubMed base, about this theme. The use of MeSH terms facilitated and systematic this process. When we know that we can construct our query and have an output more accurately. **Visual Analysis of Swallowing Efficiency and Safety (VASES): A Standardized Rating Methodology for Measuring Pharyngeal Residue, Penetration, and Aspiration on FEES**

**Session Title:** Eposter Session C: Instrumental Assessment and Dysphagia Diagnosis

**Curtis, J**; **Borders, J**; **Perry, S**; **Dakin, A**; **Seikaly, Z**; **Troche, M**

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**Introduction:** Flexible endoscopic evaluation of swallowing (FEES) is used to comprehensively examine swallowing safety (penetration/aspiration) and efficiency (pharyngeal residue). However, standardized methods to analyze safety and efficiency on FEES are lacking. Therefore, the aims of this study were to: (1) describe the development of the Visual Analysis of Swallowing Efficiency and Safety (VASES), a standardized approach to analyzing FEES; and (2) determine if novice raters could accurately analyze FEES using VASES following a standardized training protocol. **Methods:** A consensus panel of six speech-language pathologists with expertise in performing and interpreting FEES convened to develop standardized rating methods for VASES, including: (1) the use of visual analogue scales to quantify the amount of pharyngeal, laryngeal, and subglottic residue; and (2) detailing objective anatomic and temporal boundaries for rating pharyngeal, laryngeal, and subglottic residue and for scoring the penetration-aspiration scale (PAS). The panel then blindly rated FEES videos using VASES to create gold standard measurement ratings for training purposes. Next, 20 novice raters completed a VASES training module. The novice raters blindly analyzed 35 FEES video clips pre- and post-training using VASES. Statistical analyses were used to examine the differences in the accuracy of novice’s VASES ratings pre- and post-training when compared to the gold standard ratings. **Results:** All raters successfully completed VASES training. RM-MANOVA revealed a significant improvement in the accuracy of residue ratings across all landmarks (p < 0.01; partial η2 = 0.76) and PAS ratings post-training (p < 0.001). **Conclusions:** VASES is a clinically feasible approach that can be taught to novice raters to analyze pharyngeal residue, penetration, and aspiration on FEES. VASES uses visual analog scales and defined temporal and anatomic boundaries to standardize rating methods across clinicians and institutions. **Videofluoroscopy Practice Patterns: An International Survey**

**Session Title:** Eposter Session C: Instrumental Assessment and Dysphagia Diagnosis

**Balaski, C**; **Walshe, M**

Trinity College Dublin

**Introduction:** Videofluoroscopy (VFSS) is one gold-standard method of instrumental assessment for dysphagia. A limited number of
guidelines exist for VFSS but many countries do not have published VFSS practice guidelines. Even with guidelines, there is much variation within and across countries. The aims of the study are to determine (1) what practices exist for completing VFSS in Ireland and to compare these with international practices (2) if existing practices are consistent and informed by evidence.

**Methods:** An anonymous online survey was developed and piloted with local speech and language therapists and dysphagia experts. The survey was disseminated internationally from March–April 2020 through professional bodies and social media.

**Results:** 95 responses were obtained from 9 countries. 81% of clinics were SLT-led. 67% of services reported having VFSS protocols. Barium was the most frequently used contrast agent with 29% of international respondents using pre-prepared products. 75% of services manually thickening materials used recipes. Over half of respondents nationally and internationally were unaware of the pulse/frame rate used in clinic with 15 pulses/frames per second most commonly reported. Respondents rated how frequently they used 23 specified practices during VFSS. Only 4/23 practices were used frequently in both groups. Low frequency use was reported for 12/23 components in the Irish group and 9/23 in the international group. Consistency of practice was low with only 3/23 and 1/23 practices being highly consistent in the Irish and international groups, respectively.

Challenges relating to VFSS included lack of access, variation between clinicians, and working in the interdisciplinary team.

**Conclusion:** There is high variation in VFSS practices used within and between services with an under-use of the evidence base for VFSS. There is a need for validated protocols and evidence-based clinical guidelines to improve consistency and reliability of VFSS.

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**Pharyngeal High-Resolution (Impedance) Manometry: A National Survey of Speech and Language Therapist’s Practices and Perceptions**

**Session Title: Epother Session C: Instrumental Assessment and Dysphagia Diagnosis**

**Gillivan, E; Regan, J**

Trinity College Dublin

Pharyngeal High-Resolution (Impedance) Manometry (PHR(I)M) is an instrumental dysphagia evaluation that has recently entered dysphagia practice. This study aims to explore PHR(I)M practices and perceptions among national Speech and Language Therapists (SLTs). A within-subject, cross-sectional 27-item survey was disseminated online to national SLTs working with dysphagia. These results were analyzed using descriptive statistics. 46 responses were included in the analysis, of whom 6% (3/46) currently use PHR(I)M in dysphagia practice. These SLTs have higher levels of postgraduate dysphagia education, work with adults, and have a large dysphagia caseload. All respondents using PHR(I)M (6%, 3/46) use the ManoScan system, a 4.2 mm pressure and impedance catheter, and minimum 0.90% saline solution. They never (4%, 2/46) or sometimes (2%, 1/46) use topical anesthesia, use 5, 10 and 20 ml bolus volumes (6%, 3/46), and use liquid, puree, and solid consistencies (4%, 2/46), or liquid and puree (2%, 2/46). Analysis is conducted using SwallowGateway (6%, 3/46), and ManoScan (2%, 1/46). Metrics obtained include oropharyngeal oesophageal pressures, hypopharyngeal intrabolus pressure measures, and the duration and opening of the upper esophageal sphincter opening (6, 3/46). Over half of SLTs (56%, 24/43) indicated they would use it if it were available in their setting (56%, 24/43). Within the total response group: cost of equipment (78%, 35/45), training in PHR(I)M (78%, 35/45), and access to equipment (71%, 32/45) are the main barriers to setting up a PHR(I)M service. PHR(I)M’s objective and novel information on the nature of dysphagia is viewed as it’s main benefit (64%, 29/45). Based on survey findings, few national SLTs are using PHR(I)M in dysphagia practice. Where it is being used, SLTs adhere to international PHR(I)M working group recommendations. Establishment of care pathways, improved access to equipment, and PHR(I)M education and training are needed to increase adoption.

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**Swallowing-Related Fatigue: Current Practices and Clinical Perspectives**

**Session Title: Epother Session C: Instrumental Assessment and Dysphagia Diagnosis**

**Brates, D1; Namasiyavam-MacDonald, A2; Molfenter, S1**

1New York University; 2McMaster University

**Introduction:** Fatigue is commonly identified by clinicians who evaluate and treat dysphagia despite a lack of related research. The purpose of this study was to understand the role of swallowing-related fatigue in dysphagia evaluation with respect to clinician practices, perspectives, and desire for resources regarding swallowing-related fatigue.

**Methods:** A survey was conducted of ASHA-certified Speech-language Pathologists (SLPs) who evaluate and treat adult dysphagia. The survey was distributed via dysphagia-focused Facebook groups and ASHA Special Interest Group 13. Data were analyzed descriptively and by thematic analysis for free-text response questions.

**Results:** Of 426 prospective respondents, 311 completed the survey (73% response rate). While 86% of SLPs agreed that fatigue may be a concern for individuals with swallowing impairment, there was wide variability in how clinicians define and evaluate swallowing-related fatigue, and the majority (62%) define fatigue in two or more ways. Explicit evaluation of fatigue was reportedly conducted by 45% of SLPs during the clinical swallow exam (CSE), 38% during videofluoroscopy (VF), and 53% during fiberoptic endoscopic evaluation of swallowing (FEES). The most common methods for identifying fatigue were general declines in performance over the course of the assessment. SLPs reported much more reliance on patient report during CSE (41%) compared to VF (7%) and FEES (5%). Only 7% of SLPs reported being aware of any standardized methods for assessing fatigue, while 97% affirmed interest in incorporating standardized methods for assessing swallowing-related fatigue.

**Conclusion:** Our results demonstrated wide variability in how SLPs define and evaluate swallowing-related fatigue, despite the vast majority considering fatigue to be an important factor in dysphagia evaluation. This study highlights a critical gap in the clinical evaluation of swallowing, and requires significant further study to guide clinical practice.

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**Characterization of Upper Esophageal Sphincter Dysfunction in Dilation Referred Patients: A Pressure Flow Analysis Study**

**Session Title: Epother Session C: Instrumental Assessment and Dysphagia Diagnosis**

**D’Hondt, P1; Vandecruys, P1; Moonen, A; Tack, J; Rommel, N2**

1Katholieke Universiteit Leuven; 2University Hospital Leuven

**Background and Aims:** Patients presenting with dysfunction of the upper esophageal sphincter (UES) on high-resolution manometry are
in first line treated with dilation. This study aims to characterize the manometric parameters in this patient cohort. Further, we explored the most optimal treatment option for different causes of bolus flow resistance at the level of the UES and assigned our patients accordingly. Also, the effect of age on manometric outcome was explored. 

**Methods:** We retrospectively reviewed 204 adult patients who underwent high-resolution impedance manometry (HRIM) at a tertiary university hospital and were referred for dilation. In total, 791 swallows were analyzed. Pharyngeal impedance and pressure data including seventeen parameters were obtained for each patient using pressure flow analysis (PFA) on SwallowGateway.

**Results:** Abnormally increased scores for UES-integrated relaxation pressure (UES-IRP) and swallow risk index (SRI) were found in 60% and 56% of our patient group, respectively. Dilation appeared to be unnecessarily prescribed in 38% of our patients. Spearman ρ correlations were found for core parameters i.e., UES-IRP with intrabolus pressure (IBP) (0.60), pharyngeal contractility (PhCI) (0.27) and maximal admittance (MaxAdm) (−0.22), while PhCI and IBP were also weakly correlated (0.46). UES opening (MaxAdm) was significantly (p < 0.05) decreased in the oldest (> 80 years) and middle (60–80 years) age group compared to the youngest group (< 60 years).

**Conclusion:** Dilation is prescribed frequently, while the reason for referral is not always clear. HRIM has a crucial role in referral because UES relaxation was predominantly impaired. However, it lacks measurements of hyolaryngeal elevation and should therefore be used complementary to videofluoroscopic swallowing study (VFSS). In the current study, dilation was unnecessarily prescribed in 38% of our patients. Spearman ρ correlation of the effect of age on manometric outcome was explored. Also, the effect of age on manometric outcome was explored. Aspiration, penetration, and residue. Accuracy, sensitivity, specificity, positive, and negative predictive values were calculated in each group. 

**Results:** A total number of 38 patients were included in this study, with a mean age of 64.5 years old. Respectively, 7 and 6 patients were detected with aspiration and penetration in FEES, while 7 and 5 patients in videomanometry. Sixteen patients were detected with residue in FEES and 20 patients in videomanometry. Nineteen patients had an increased SRI. Penetration group showed low sensitivity, while aspiration and residue group showed fair to good agreement among the assessment methods.

**Discussion/Conclusion:** Using FEES as the reference assessment, this study shows a good correlation between FEES and videomanometry assessment outcomes, which indicates that combined videomanometry is equally able to diagnose oropharyngeal dysphagia as FEES on the parameters of aspiration and residue.

**Skill Training with Biofeedback for People with Parkinson’s Disease and Dysphagia: Protocol for a Feasibility Study During Covid-19**

**Session Title:** Epister Session D: Dysphagia During/Post Covid-19

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**Introduction:** Due to impaired motor programming in people with Parkinson’s Disease (PwPD), evidence suggests that skill training is important as a focus in dysphagia therapy. Surface electromyography (sEMG) to provide biofeedback can facilitate motor learning and hence skill training in PwPD. To date, 4 studies have assessed sEMG biofeedback in PwPD. One implemented skill training using Biofeedback in Strength and Skill Training (BiSSkIT) with positive outcomes [1]. We present a protocol for a new feasibility study on skill training using BiSSkIT to improve outcomes for PwPD and dysphagia. The objective is to inform the design of a larger clinical trial.

**Methods:** Ethical approval was obtained for this study before COVID-19. Using a multiple baseline within-subject design, an intensive therapy protocol was planned implementing skill training with BiSSkIT. This incorporates motor learning and neural plasticity principles for a minimum of 10 PwPD. FEES was proposed as an instrumental assessment along with other outcome measures.

**Results:** At the point of data collection, COVID-19 pandemic meant the planned study posed a high risk to participants and had to be revised for implementation. Instead of the results of data collection, an amendment of the therapy protocol for the COVID-19 era is provided incorporating international guidelines. Face-to-face contact is deemed necessary. We suggest at minimum participants and researchers should be tested/screened for SARS-CoV-2. A risk assessment should be conducted locally and safety measures must be applied accordingly to reduce risk of virus contagion. The impact of wearing PPE on the conduct of the study and the participants’ experience with therapy is considered. New challenges in therapy delivery are revealed.

**Conclusion:** We highlight the importance of incorporating new safety measures to clinical studies as well as challenges and opportunities for research in this COVID-19 era.
Analysis of Dysphagia Presentation, Predictors for Dysphagia & Recovery Patterns in Patients Presenting to a Large Acute Teaching Hospital with Covid-19

Session Title: Eposter Session D: Dysphagia During/Post Covid-19

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Introduction: Speech & Language Therapists (SLT) worked at the forefront during the COVID-19 pandemic along the continuum of care from intensive care to rehabilitation. Given that COVID-19 was a novel clinical presentation, it was of critical importance to capture all relevant data in relation to both the dysphagia presentation of this clinical cohort and the involvement of SLT. Despite the trauma of the pandemic, an excellent opportunity for SLT to be at the forefront of current research in this new clinical cohort was identified.

Materials and Methods: A dataset was developed to log each patient presenting with COVID-19 referred to SLT capturing a wealth of clinical data against which to further understand the respiratory dysphagia presentation, predictors for dysphagia severity, e.g., chest X-ray (CXR) findings, age, comorbidities, medications, and oxygen delivery methods and dysphagia recovery patterns. Swallowing recovery patterns were measured using the Functional Oral Intake Scale (FOIS) on initial assessment and discharge. The research goals include identifying clinical presentation of this patient cohort in relation to communication and swallowing deficits, swallowing recovery patterns and therapeutic input. Attendance at webinars from the European Society for Swallowing Disorders (ESSD), Royal College of Speech & Language Therapists (RCSLT), and the Acute Frailty Network (AFN) has proven invaluable in structuring our research questions.

Results: Dataset remains live as we continue to treat patients with COVID-19. Correlation analysis will be completed to establish if any key area predicted dysphagia severity, e.g., correlation between age, comorbidities, CXR findings, or 02 delivery methods and FOIS.

Conclusion: This research will help us greater understand the dysphagia presentation and predictors for dysphagia in COVID-19 and highlight the role of the SLT in assessing and providing rehabilitation for these patients.

Is There a Role for Neuromuscular Electrical Stimulation Therapy Programs (e.g., the Ampcare Effective Swallowing Protocol) in the Treatment of Post-Covid-19 Dysphagia?

Session Title: Eposter Session D: Dysphagia During/Post Covid-19

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Introduction: The Ampcare Effective Swallowing Protocol (ESP) is a swallow rehabilitation therapy program. It combines neuromuscular electrical stimulation (NMES) to the suprahyoid muscles with swallow exercises completed against resistance. The aim of the therapy program is to re-educate neuromuscular pathways and strengthen muscles involved in swallowing. There is an increasing body of evidence showing functional gains are made by patients who complete this therapy after experiencing dysphagia following stroke. There have also been reports of positive outcomes for patients with dysphagia resulting from non-stroke etiologies (Martindale et al., 2019). Recovery of swallow function post-Covid-19 is an area about which much is still unknown; however, it is possible that patients may experience a faster and more complete recovery of swallow function after completing the Ampcare ESP.

Materials and Methods: Patients presenting with dysphagia following survival of Covid-19 who exhibit reduced laryngeal elevation were offered the Ampcare ESP while recovering in the acute hospital setting. Measures of dysphagia severity (Rosenbek Penetration and Aspiration Score), functional swallowing ability (Functional oral intake scale) and swallow-related quality of life (Swal QOL) were collected before and after therapy.

Results: We present the outcomes of patients who were offered the Ampcare ESP in an NHS hospital setting (unknown at time of writing).

Discussion/Conclusion: This poster presents preliminary findings regarding the feasibility of providing the Ampcare ESP for patients with dysphagia following survival of Covid-19 and the outcomes of a small number of patients who have been offered the therapy program. We discuss the benefits (or otherwise) and barriers of providing an NMES therapy program for this population, about whom much remains unknown at the current time.

“I Feel Like I’m Drowning” – The Benefits of Early Speech and Language Therapy Input in Tracheostomy Management for a Patient Who Presented with Covid-19 and Newly Diagnosed Leukemia

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University College London Hospitals

Introduction: Speech and Language Therapists (SLT) played a vital role in the weaning process of patients who presented with tracheostomies as a result of COVID-19. Here within follows a single case report of a patient who presented with COVID-19 and acute myeloid leukemia, cared for at a specialist hematology center.

Isolated case report: The patient was intubated for 17 days prior to tracheostomy placement. On initial cuff deflation, the patient verbalized that they felt they were “drowning.” Cranial nerve (CN) examination: soft palate asymmetry on the left (CN IX) with hypernasality and a tongue deviation to the right (CN X11). A flexible nasendoscope (FNE) was performed. A left vocal cord palsy fixed in abduction was identified along with copious thick secretions which were observed to be aspirated. The patient was decannulated 26 days post-initial cuff deflation. A repeat FNE was carried out and there were significantly less secretions. The patient was dysphonic with diplopaphia. A videofluoroscopy (VFS) was carried out which identified a severe sensorimotor pharyngeal dysphagia. VFS imaging suggested a neurological component; however, the patient’s brain scan was not in keeping with this hypothesis. The patient did not have central nervous system involvement of their leukemia either.

Results: Early SLT involvement led to safer tracheostomy weaning and identification of laryngeal pathology. Intensive dysphagia rehab was commenced on the principles of neuroplasticity.

Discussion: A large proportion of patients with a hematology background present with neurological and cranial nerve involvement despite a lack of brain imaging to support this. These data suggest the importance of SLT in this cohort of patients with instrumental assessment being invaluable in supporting this.
**Abstract**

*Poster of Merit*: Dysphagia & Dysphonia Outcomes in Covid-19 Patients with Tracheostomy: Findings from a Designated Single Site Critical Care Hub

Session Title: Eposter Session D: Dysphagia During/Post Covid-19

McRae, J; Brooks, C; Cruz, K; Doris, O; Kimber, R; Menkinoska, A

UCLH

**Introduction**: Patients with COVID-19 required modifications to respiratory management due to concern about aerosol generating procedures [1, 2]. This restricted placement of tracheostomy tubes (TT) and use of flexible nasendoscopy (FNE) for respiratory management. This hospital was designated as a hub for COVID-19 patients. Healthcare professionals worked together to facilitate optimal interventions to support effective treatment.

**Methods**: New referrals to Speech and Language Therapy (SLT) were registered in a database specifying age, gender, and intubation date, TT date, dysphagia, and dysphonia outcomes. FNE was undertaken to investigate laryngeal pathology.

**Results**: Over 14 weeks, 77 patients with confirmed COVID-19 were referred to SLT for assessment, 51% were in critical care. A total of 38 patients required intubation with 26 subsequently needing TT. Of this cohort, mean age was 56 years (range: 28–69 years), 73% male, with a mean intubation prior to TT of 17.2 days (3–33 days) and mean time with TT 23.3 days (7–53 days). Dysphonia was identified in 20 TT patients and 5 previously intubated patients; 11 patients underwent FNE. Laryngeal pathology was identified in 82%, including edema, vocal cord palsy (4), vocal cord atrophy (2), glottic gap (2), granuloma (1), and vocal cord nodules (1). Twelve patients had dysphonia on discharge. All 26 TT and 11 previously intubated patients had bedside swallowing assessments. All showed symptoms of fatigue and generalized weakness that required swallow strengthening exercises and therapeutic food trials. 97% patients resumed oral intake on IDDSI Level 0 and Level 7 on discharge.

**Conclusions**: Dysphonia and dysphagia were key symptoms of COVID-19 patients, likely due to prolonged intubation. Multi-professional working with early TT placement and use of FNE helped facilitate timely intervention and management with good outcomes for patients. Long term needs remain unknown.

**Respiratory Circuits for Patients with Tracheostomy and Severe Covid-19: Considerations for Swallowing**

Session Title: Eposter Session D: Dysphagia During/Post Covid-19

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**Introduction**: Patients with severe COVID-19 often have a complex clinical course including tracheostomy placement and critical illness myopathy. To reduce the risk for environmental contamination and viral transmission, management recommendations include: cuff inflation maintenance, heat and moisture exchange (HME) filters, and closed suction system (CSS) usage. While cuff inflation affects hyolaryngeal displacement in critical illness (Amathieu et al., 2012), the effect of this added circuitry on swallowing biomechanics in this population is yet to be determined.

**Methods**: Our objective was to perform an ex situ theoretical displacement analysis of the additional HME and CSS necessary during the assessment and management of patients with tracheostomy and COVID-19. We calculated potential effect using beam force theory with first order approximation. To do so, we measured three permutations: A (tracheostomy tube [TT]), B (TT + HME filter) and C (TT + HME filter + CSS) (Fig. 1). All permutations were weighed using an OHAUS Adventurer analytical balance. Length was measured using ImageJ (v. 1.8.0_112) for TT curve, and a digital caliper (model DIGIMESS 100.17) for straight structures. All measurements were made in triplicate with the mean (SD) included in the theoretical calculations. The TT elastic modulus was assumed to be 15 megapascals.

**Results**: Weight (gm) of A, B, and C were 11.7, 44.4, and 80.1, respectively. When compared to A alone, this results in a three- and seven-fold increase. Theoretical force effect of B and C on displacement was negligible. However, a 1 mm deflection occurs if additional weight of 130gm was applied to A.

**Conclusions**: Additional weight is associated with HME and CCS with additional force deflection dependent upon weight. While the displacement effect is negligible ex situ, in vivo displacement investigations are necessary in the context of critical illness myopathy given the known impact of other tracheostomy modifications. Critical illness myopathy given

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**Fig. 1** Devices used for tracheostomy management. A Tracheostomy tube (TT) alone; Portex® BlueLine Ultra® 6.0, without inner cannula; B TT with Gibeck® Humid-Vent® HME filter; C Complete circuit: TT with HME and closed suction systems (CSS)
Prevalence of Covid-19-Related Dysphagia Across Healthcare Institutions: A Nation-Wide Study

Kalf, H1; Adbegovic, I1; Brink, J2
1Radboudumc; 2Dutch Association of Logopedics and Phoniatrics

Introduction. Patients with covid-19 who need professional care suffer from severe weakness, in particular after mechanical ventilation. Dysphagia is one of the consequences, but its prevalence by covid-19 was unknown. Therefore, a consortium of speech-language therapists (SLTs) started a nation-wide study to collect data from as much healthcare institutions as possible. This report on prevalence of dysphagia is part of that study.

Methods. A secured online survey for weekly input was constructed to collect per institution: (a) the number of confirmed covid-19 patients referred to an SLT, compared to (b) total number of covid-19 patients; and (c) numbers of patients per score on a validated 6-point dysphagia scale. SLTs were invited to cooperate via a newsletter and after signing informed consent, they were given access to the survey. Data were stored in a secured database and analyzed in Excel. Here, dysphagia scores were dichotomized into dysphagia (1–5) vs. normal swallowing (6).

Results. During eight weeks (May 11–July 3) the survey was completed weekly by SLTs from 24 hospitals, 17 nursing homes, 8 rehabilitation centers and 17 private practices. In hospitals, SLTs were overloaded with covid-19 patients and referral rates ranged from 33 to 53%, while the mean prevalence of dysphagia was 90%. In nursing homes SLTs had very limited access to patients because of safety measures, but the mean prevalence of dysphagia of referred covid-19 patients was 71%. In the post-acute stage, SLTs in rehabilitation centers reported referral rates ranging from 33 to 60% and a mean prevalence of dysphagia of 68%. SLTs in private practices reported signs of dysphagia in 15% of the patients.

Conclusion. Covid-19-related dysphagia is indeed highly prevalent during hospitalization and present in the post-acute stage as well, depending on the need for rehabilitation services. That explains that SLTs are needed for more than half of covid-19 patients who require professional care.

Severity Profiles of Dysphagia After Covid-19 from Acute to Post-Acute Phase

Kalf, H1; Adbegovic, I1; Brink, J2
1Radboudumc; 2Dutch Association of Logopedics and Phoniatrics

Introduction. Patients with covid-19 who need professional care suffer from severe weakness, in particular after mechanical ventilation. Dysphagia and non-oral intake of food is one of the consequences, but its severity resulting from this disease was unknown. Therefore, a small consortium of speech-language therapists (SLTs) started a nation-wide study to collect data from as much healthcare institutions as possible. This report on severity of dysphagia and change of oral intake is part of that study.

Methods. SLTs were invited via a newsletter and social media to cooperate in a weekly online survey to provide total numbers of patients with confirmed covid-19 and their scores on validated 6-point scales including 'oral intake' (1 = full enteral feeding; 6 = normal diet) and ‘dysphagia’ (1 = apha; 6 = normal swallowing). After signing informed consent, they were given access to fill in the numbers of patients per score. Data were stored in a secured database and analyzed in Excel.

Results. During eight weeks (May 11–July 3), the monitor was completed weekly by SLTs from 24 hospitals, 17 nursing homes, 8 rehab centers, and 17 private practices. Their combined weekly scores were based on a mean of 175 patients and are presented in Figs. 1 and 2. In the hospitals, severe dysphagia was the most common with almost 70% of patients being fully or partially dependent from tube

Fig. 1 Aggregated numbers of dysphagia severity rates over 8 weeks in acute stage (A, B) and post-acute stage (C, D). Black = score 1 (very severe dysphagia); darkest gray = 5 (severe dysphagia); dark gray = 4 (moderate dysphagia); gray = 3 (mild dysphagia); light gray = 5 (minimal dysphagia); lightest gray = 6 (normal swallowing)
feeding. Lower rates of severe dysphagia including tube feeding were seen in rehabilitation centers, but in private practices, swallowing and oral intake became close to normal.

**Conclusion.** Although these are aggregates numbers, no individual patients’ follow-up, the dysphagia severity profiles show a clear picture of covid-19-related dysphagia from the acute stage to recovery. All patients that were scored by the SLTs received usual dysphagia management. Future research is needed to better understand which treatment options best fit this covid-19-related dysphagia.

**Covid-19: Signs and Symptoms Related to the Feeding Process**

**Session Title:** Eposter Session D: Dysphagia During/Post Covid-19

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Universidade de Évora

The Coronavirus disease (Covid-19) includes asymptomatic cases, mild symptomatic disease, and mild or severe pneumonia. Considering respiratory, gastrointestinal, neurological, and perceptual changes, it is worth raising the association between Covid-19 and feeding disorders.

**Materials and Methods:** Adults (18–64 years) who presented and recovered from Covid-19 (excluded neurological disorders, head/neck tumors) answer, via email or social networks, a Questionnaire of Signs and Symptoms developed by the researchers. The study is conducted under Declaration of Helsinki principles and approved by an institutional review board.

**Results:** For the initial data, collected in June–July 2020, 62 volunteers agreed to participate, but 12 did not answer all the questions, being excluded. Considering 50 participants (32 female, 18 male), 70% had symptoms but were not hospitalized, 20% were asymptomatic, 6% were hospitalized and 4% ventilated. When analyzing only symptomatic patients, the most referred answers were headache (70%), body pain (67.5%), fever (67.5%), fatigue (55%) and cough (50%). Signs and symptoms related to feeding include hypogeusia (42.5%), hyposmia (40%), dry mouth (20%), cough during/after feeding (17.5%), difficulty to swallow (10%), pain to swallow (7.5%) and prefer pasty food (5%). Most volunteers (55%) reported 1–2 of these symptoms during Covid-19, 25% did not report feeding symptoms, 17.5% reported 3–4, and 2.5% reported 5–6. Participants also referred hypogeusia (22.5%), hyposmia (20%), dry mouth (15%), cough during/after feeding (10%), difficulty to swallow (5%) and pain to swallow (5%) after recovering from Covid-19.

**Discussion/Conclusion:** Initial data indicate the presence of signs and symptoms related to feeding disorders during Covid-19, even in mild cases. The occurrence remains, at lower rates, after patients recover from the disease. It is interest to note that the results presented in this abstract are preliminary and the investigation is in progress.

**Effects of Carbonated Beverages on Sustained Swallowing Behavior Changes Using Swallowing Sound Analysis**

**Session Title:** Eposter Session E: Instrumental Assessment/Treatment

Morishita, M1; Sota, J2; Kobayashi, M2

1Kibi International University; 2Watanabe Hospital

**Introduction:** Our previous study suggested that changes in swallowing behavior persist for a short time after swallowing carbonated beverages. By measuring how long changes in swallowing behavior...
Aspiration risk was higher in infants with
infants with
Esophageal orifice.
behavior caused by carbonated beverages have subsequent effects,
temporal changes in any item.
beverage. Under the control conditions, there were no significant
time were observed until 7 min after swallowing the carbonated
swallowed 5 mL of water and, after a sufficient pause, 20 mL of a
carbonated beverage. For comparison, swallowing sounds before and
after swallowing the same volume of water were also measured on a
different day (control condition). Analysis was performed to calcu-
late: the time from a start signal to the beginning of swallowing
(pharyngeal reaction time); those when the first and second peak
components of individual swallowing sounds appeared (P1 and P2
times, respectively); and that when all swallowing sounds were
identified (swallowing sound time). For each item, a linear mixed
model was created focusing on the relationship between the condi-
tions and elapsed times.

**Results:** Significant shortening of the P2 time and swallowing sound
time were observed until 7 min after swallowing the carbonated
beverage. Under the control conditions, there were no significant
temporal changes in any item.

**Conclusions:** The present study revealed that changes in swallowing
behavior caused by carbonated beverages have subsequent effects,
especially on the movement of the hypopharynx and esophageal
orifice.

**Quantitative Video-Fluoroscopic Analysis of Swallowing in Infants**

**Session Title:** Eposter Session E: Instrumental Assessment/Treatment

**Dharmarathna, I; Miles, A; Allen, J**

The University of Auckland

Videofluoroscopic study of swallowing (VFSS) is often used to
close presence/absence of aspiration and swallow risk symptoms in
infants. This underutilizes the study and misses an opportunity to
obtain information on underlying physiologic swallowing parameters
for individualized treatment. This study utilized objective, quantita-
tive VFSS swallow measures to profile swallowing in infants and to
determine the likelihood of objective measures predicting risk of
swallow impairments including airway violation, reflux and post-
swallow residue. Our retrospective observational study evaluated 146
bottle-fed infants (0–9 months) referred for VFSS with any kind of
feeding related concern. Frame-by-frame analysis of 20-s video loops
of mid-feed sucking were completed to obtain quantitative timing,
displacement and coordination measures as well as presence of other
findings including aspiration, residue and reflux. Good inter-rater
reliability and excellent intra-rater reliability were achieved for all
swallow measures. Spearman correlation, Mann–Whitney U test, and
binomial logistic regression were conducted to determine statistical
associations between swallow measures and binary reporting of
swallow impairments. 49% of infants demonstrated at least one
penetration or aspiration event. Total pharyngeal transit time (TPT)
and suck-swallow ratio were associated with aspiration (p < 0.05).
Infants with > 3 sucks per swallow had significantly longer TPT and
their risk of aspiration was greater than those with < 3 sucks per
swallow (RR 1.23, 95% CI 0.43–8.507, p = 0.03). Pharyngeal con-
striction ratio (PCR) and bolus clearance ratio (BCR) were associated

**The Use of Ultrasound as Biofeedback in Learning Mendelsohn Maneuver**

**Session Title:** Eposter Session E: Instrumental Assessment/Treatment

**Ng, K; Kwong, E; Leung, M; Zheng, Y**

The Hong Kong Polytechnic University

**Introduction:** In swallowing rehabilitation, learning a swallowing
maneuver is usually prescribed to improve swallowing ability.
Despite that surface electromyography (sEMG) is commonly used to
facilitate such learning, it provides non-kinematic and non-specific
information regarding structure and muscular movements. Ultrasound,
the other hand, provides kinematic information of the
swallowing movement. Exploration on the potential of applying
ultrasound as biofeedback to swallowing rehabilitation is warranted.
The present study aimed to compare the effectiveness of ultrasound to
that of sEMG as biofeedback in the learning of the Mendelsohn
Maneuver.

**Methods:** Forty healthy adults who were naïve to the Mendelsohn
Maneuver were randomly assigned to learn the novel maneuver by
using either ultrasound or sEMG as biofeedback during the Learning
phase. Full sets of data were obtained from 38 subjects. Their accu-
cacies of performing the Mendelsohn Maneuver without biofeedback
were measured immediately after the Learning Phase (Post-training
accuracy) and one-week post-learning (Retention accuracy).

**Results:** The number of training blocks required to learn the Men-
delsohn Maneuver was comparable between the two biofeedback
groups (t(31.51) = 0.987, p = 0.330). However, the ultrasound group
attained significantly higher post-training accuracy (t(28.8) = 4.04, p < 0.001, d = 1.309) and retention accuracy (t(30.78) = 2.13, p = 0.042, d = 0.690) than the sEMG group.

**Conclusion:** Ultrasound, which contains kinematic and specific
information of the swallowing movement, is a more effective
biofeedback than sEMG in learning the Mendelsohn Maneuver.
Further investigation on its application on dysphagic patients in
swallowing rehabilitation is recommended.

**Examination of Swallowing Mechanisms Using Ultrasonography: A Pilot Study**

**Session Title:** Eposter Session E: Instrumental Assessment/Treatment

**Shek, T; Kwong, E; Leung, M; Zheng, Y**

The Hong Kong Polytechnic University

**Introduction:** Ultrasonography is a non-invasive, radiation-free, and
easily accessible technique that is potentially applicable to assist the
objective evaluation of dysphagia. This study aimed to identify pos-
sible patterns observed using ultrasound imaging in the temporal
coordination between hyoid bone elevation and tongue base retraction
when swallowing boluses of different size and consistency.
Method: Forty-one non-dysphagic young adults of both genders who aged between 20 and 30 participated in the study. Ultrasound images were recorded during dry swallows; and swallows of 5 mL of water, 10 mL of water, 5 mL of extra thickened water, and 10 mL of extra thickened water. From the ultrasound images, the time frames of onset of action, maximum point, and the onset of relaxation were extracted for hyoid bone elevation and tongue base retraction in each swallow. The percentages of occurrence of a consistent temporal pattern in the above-mentioned events of different bolus types were measured in the study.

Results: Across different bolus types, the onset of hyoid bone elevation precedes the maximum point of tongue base retraction and the maximum point of tongue base retraction precedes the relaxation of hyoid bone elevation consistently (100%). Comparing the onsets of the movements, hyoid bone elevation precedes tongue base retraction in 94.5% of the time, in which the percentage is higher with actual bolus (97.4%-100%) than with dry swallows (80%). Results suggested individual differences in temporal swallowing patterns and the margin for individual differences may be different among bolus types.

Conclusion: Ultrasound may be adopted as a non-invasive examination tool that provides objective temporal measurements on swallowing events. Further investigation on the application of the measurement method used in the present study to distinguish between dysphagic and non-dysphagic individuals is warranted.

Identifying Fatigue of Bulbar Muscles During a Lingual Endurance Task Using Submental Surface Electromyography

Session Title: Eposter Session E: Instrumental Assessment/Treatment

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Introduction: Muscle fatigue can effect swallowing safety for patients with dysphagia. However, there is currently no physiological method to assess fatigue of bulbar muscles without the use of complex algorithms. Surface electromyography (sEMG) is used in the limb literature to measure fatigue. If functional power remains constant, fatigue is indicated by increased sEMG amplitude. The current research investigated the use of simple sEMG amplitude to indicate fatigue during a lingual press task.

Methods: Healthy participants (n = 24) performed eight trials of a maximal endurance lingual press task. Participants were instructed to press on a bulb placed over the alveolar ridge at 50% of their maximum output until they could no longer sustain pressure. Muscle activation was measured by concurrent submental sEMG. The duration and average sEMG amplitude of each trial were extracted for analysis.

Results: There was a significant effect of trial on endurance time (X2[7] = 41.8, p < 0.001). Median duration of lingual press was 20.7 s shorter on the final attempt compared to the initial attempt (V = 225 p < 0.001). There were no significant differences in endurance time between sequential trials. For average sEMG amplitude, there was a significant main effect of trial (X2[7] = 14.3, p = 0.05); however, after adjustment for multiple comparisons, post hoc analyses demonstrated no differences in the comparisons of interest.

Conclusion: Changes in endurance time indicate a gradual onset of fatigue; however, this was not represented by sEMG amplitude. The lack of change observed in sEMG output may be due to the differential effects of fatigue on submental and intrinsic lingual muscles during the task. Fatigue of intrinsic lingual but not submental muscles could lead to a reduction in endurance time with no change in measured sEMG signal. Further research is needed to develop a method of detecting fatigue of bulbar muscles through non-invasive, clinically accessible means.

*Poster of Merit*: Multiple Swallowing Behavior During High-Resolution Pharyngeal Manometry: Prevalence in Health and Subtyping

Session Title: Eposter Session E: Instrumental Assessment/Treatment

Omari, T; Ferris, L; Schar, M; Cock, C; Doeltgen, S

Flinders University

Introduction: Typical voluntary bolus swallowing consists of a single discrete oropharyngeal swallow. Multiple Swallow Behavior can occur when attempting to swallow boluses that exceed the limits of the swallowing system. We hypothesized that Multiple Swallow Behavior can be detected and subtyped utilizing high-resolution pharyngeal manometry (HRPM) with impedance.

Methods: Prevalence of Multiple Swallowing Behavior was examined in 50 healthy subjects (29 females, mean age 47 years, range 19.8–79.5 years). HRPM was performed using the Medical Measurement Systems motility system and 8-French pressure-impedance solid state catheter (32 × 1 cm spaced uni-directional pressure sensors, 16 × 2 cm impedance segments). Triplite boluses of 3, 5, 10, and 20 mL of thin, mildly thick, and extremely thick consistencies were tested. Multiple Swallow Behavior was defined by a sequence of two or more swallows on the pressure topography tracing, occurring after oral bolus administration, with an inter-swallow interval of 5 s. Results: Single swallows were the most common behavior observed. However, 28 participants also exhibited at least one Multiple Swallow Behavior event. Larger bolus volumes elicited more Multiple Swallow events. Using impedance, Multiple Swallow Behavior was further subtyped as Secondary Dry Swallows (70%, considered normal), Preceding Dry Swallows (1%, considered abnormal), Piecemeal Swallows (25%, considered abnormal for volumes < 20 mL), or Clearing Swallows (4%, considered abnormal).

Conclusion: HRPM with impedance enables the detection and characterization of Multiple Swallow Behavior and potentially improves our ability to distinguish manifestations of swallowing disorders. Further studies are required to investigate Multiple Swallow Behavior subtypes in dysphagic populations.


A. Secondary Dry
B. Preceding Dry
C. Piecemeal
D. Clearing

Pharynx
UOS

Bolus transferred completely in one swallow attempt followed by one or more dry swallows
Bolus transferred completely in one swallow attempt preceded by one or more dry swallows
Bolus transferred in two or more swallow attempts
Bolus transferred incompletely with evidence of residual between swallows. Can be combined with a Piecemeal pattern

A. Multiple Swallowing Behaviour as a Proportion of Total Swallows

Multiple Swallows
Single Swallows

85%
15%
4% - 1%
25%
70%

C. Participants Multiple Swallowing at Different Volumes

Secondary Dry
Piecemeal
Clearing
Preceding Dry

0% 5% 10% 15% 20%
3ml 5ml 10ml 20ml

D. Participants Multiple Swallowing at Different Consistencies

Secondary Dry
Piecemeal
Clearing
Preceding Dry

0% 5% 10% 15% 20%
IDDSI 0 IDDSI 2 IDDSI 4

IDDSI 0
IDDSI 2
IDDSI 4
"Poster of Merit*: Which Texture Property of Semi-Solid Food Affects the Effort of Pharyngeal Swallow in the Elderly?

Session Title: Epoter Session E: Instrumental Assessment/Treatment

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Introduction: Increasing viscosity can reduce the risk of aspiration into the airway, but conversely, very thick solid food may require greater strength and effort. We assumed that semi-solid foods with similar viscosities will behave differently in the oropharynx and there might exist the possibility that properties other than viscosity may have clinical relevance. This study aimed to find out the texture of semi-solid foods that affects the effort of pharyngeal swallow in the elderly.

Materials and Methods: Nine kinds of semi-solid foods not requiring mastication were selected for texture profile analysis (TPA) and included whipped cream, mayonnaise, soft tofu, mango pudding, boiled mashed pumpkin, boiled mashed potatoes, boiled mashed sweet potatoes, red bean paste, and peanut butter. Hardness, adhesiveness, and cohesiveness of each food were measured three times by using the rheometer. A blinded sensory test using a 9-point hedonic scale was also conducted in eighteen elderly people to investigate how much effort was required to swallow food, and how much of the food remained in the pharynx after swallowing. The correlation between texture and the sensory outcome was statistically analyzed.

Results: Foods that belonged to the same viscosity category showed different texture values, and the participants also rated different scores respectively. Only adhesiveness among three properties was significantly correlated with the sensory test. (r = 0.882, p = 0.002 for difficult to swallow, r = 0.879, p = 0.002 for sense of residue).

Conclusions: Adhesiveness was the most important property of the semi-solid foods, requiring most efforts in pharyngeal swallow in the elderly. If we select and provide food having low adhesiveness value in the same viscosity category, there might be the possibility to make it easier to swallow in older adults.

The Social Impact Of Contemporary Dysphagia Research: An Altmetric Analysis

Session Title: Epoter Session F: Professional Roles in Dysphagia Management

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Introduction: Altmetrics are a new online metric assessing the societal impact of research in an era where there is growing awareness of the limitations to traditional research metrics (citation counts, journal impact factor and downloads). This study aimed to (a) identify the characteristics of dysphagia articles receiving the most online attention (b) identify associations between these articles’ altmetric scores and traditional metrics (c) establish any differences in altmetric scores between open access or pay-for-access articles or between research with or without funding.

Methods: An ‘Altmetric Explorer’ search was conducted to identify articles using the keyword ‘dysphagia’ published between January 2014 and 2019. The top 100 articles with the highest altmetric attention score were analyzed. Descriptive statistics, Spearman’s correlation, and a Kruskal–Wallis H test were performed.

Results: The top 100 dysphagia articles generating the most online attention discussed mostly adult populations (n = 95), focusing mainly on neurological clinical populations (n = 30). Most studies were systematic reviews (n = 27), and randomized control trials (n = 18). Articles were published in 51 different journals belonging to various specialties, with most published in the journal dysphagia (n = 34). Articles were mainly discussed on Twitter, Facebook, Medeley and News Outlets No statistically significant correlation was found between altmetric scores and traditional metrics. No statistically significant difference was found in altmetric scores between funded or non-funded articles. However, a significant difference (x² (3) = 9.37, p < 0.001) was identified between altmetric scores and articles which were open access or non-open access.

Conclusion: In an expanding digital age, the use of altmetrics to track online research engagement is increasingly relevant. Research is necessary to identify the relevance and implications that almetrics pose for the dysphagia discipline.

The Decision Making Process for Eating and Drinking with Accepted Risk in the Acute Hospital Setting

Session Title: Epoter Session F: Professional Roles in Dysphagia Management

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Introduction: Management of oropharyngeal dysphagia can involve recommendations to continue with oral intake, while accepting risk of aspiration and/or choking. This decision can be perceived as challenging and ethically complex. Prior to implementation of protocols for guidance, further study is needed to establish how these decisions are made, and if indeed, there are areas for improvement. This study aims to review the decision making process in the acute hospital setting, and to formulate hypotheses for further study.

Method: A retrospective case series of 18 acute inpatients was completed, each having a diagnosis of dysphagia and deemed to be eating and drinking with accepted risk. Documentation of the following key aspects of decision making was collated, each specifically regarding oral intake and dysphagia; (i) discussion with individual (ii) consideration of capacity, (iii) discussion of best interests, (iv) discussion with family/nex of kin (NOK), (v) explicit plan regarding oral intake, and (vi) average length nil per oral (NPO) pending decision/

Results: Table 1 outlines the documentation. Rates are variable; discussion with the individual and consideration of individual capacity for decision making were documented the least. In addition, 7 patients (39%) were kept NPO with no alternative nutrition for one day or more, while decision making was underway.

Conclusion: From this study, the following hypotheses are generated which require further exploration; i) patients are not consistently involved in decisions regarding their dysphagia and oral intake, regardless of perceived capacity ii) families/NOK are often involved in decisions regarding dysphagia, despite lack of discussion with the individual themselves iii) documentation of rationale for decisions regarding oral intake with oropharyngeal dysphagia needs to be explicit iv) decision making for individuals with dysphagia needs to be efficient and timely to avoid patients being NPO unnecessarily.
Implementing The IDDSI Framework: Proposing An Adoption Model By Experience-Based Recommendations

Session Title: Epster Session F: Professional Roles in Dysphagia Management

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Introduction: The International Dysphagia Diet Standardization Initiative (IDDSI) pursues the goal of a globally uniform terminology with standardized definitions for texture-modified food and drinks in the treatment of patients with oropharyngeal dysphagia (OD) of all age ranges, all rehabilitation settings and all cultural backgrounds (Cichero et al. 2017). The transition from antecedent diet classifications is guided by a phased MAPA-plan (monitor-aware-prepare-adopt), provided and supported by the IDDSI-board itself. However, experiences from implementation projects reveal specific demands of all contributing stakeholders that may not be covered by the guidelines to ensure a stable change to the IDDSI framework.

Materials and Methods: Six guideline-based interviews from two different healthcare institutions were conducted, prepared, and analyzed. The interviews discuss experiences and expectations regarding the IDDSI-transition process within 4 different domains (time schedule, training, interprofessional exchange and finance). The subjects (Dietitians/SLPs, nursing and kitchen staff) and the institutions (pre- and post-IDDSI) were cross-matched and compared based on the Qualitative Content Analysis.

Results: Results indicate high agreement with expectations regarding the implementation of IDDSI. However, there is emphasis on interprofessional communication, multidimensional training, and extended time periods guided by an expert implementation team to successfully adopt the framework. Ultimately, these aspects merge in an experience-based model that extends the implementation guidelines provided by the board.

Conclusions: An experience-based model is proposed to add useful recommendations to the MAPA-based implementation guideline for healthcare institutions implementing the IDDSI framework.

Texture Modified Consistencies for Persons with Dysphagia: Swedish Translation and Cultural Adaption Of International Dysphagia Diet Standardization Initiative

Session Title: Epster Session F: Professional Roles in Dysphagia Management

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Swallowing difficulties are estimated to affect 590 million people worldwide. Food and/or fluid consistency modification is a common intervention for people with dysphagia [1]. Previous research identified that over 70 different terms were used for modified foods/liquids among Swedish SLPs (Speech Language Pathologists) reportedly negatively impacting multidisciplinary communication, dysphagia management, and patient safety [2]. The International Dysphagia Diet Standardization Initiative (IDDSI) is being increasingly used as the recommended terminology for modified foods/liquids. This study aimed to translate and culturally adapt the IDDSI framework and testing methods into Swedish.

Method: The 10 step translation process (Fig. 1) was based on the World Health Organization translation guidelines. Validity of the translation was assessed using Content Validity Index (CVI) from two ratings performed at different stages, by 12 experts (certified dietitians and SLPs). The translation was rated for linguistic correlation and culturally appropriate/applicable correlation with respect to the Swedish language and context. Rater reliability was also calculated using Intraclass Correlation Coefficient (ICC) from 20 SLPs assessments of 10 fictitious patient cases (previously published) [3].

Results: Very high validity results for (a) linguistic correlation (CVI = 0.98) and (b) cultural applicability (CVI = 0.92) with significant improvement of CVI between expert panel’s first and second...
assessed rounds was achieved (p < 0.001). Very high inter-rater reliability (ICC = 0.99) was demonstrated.

**Conclusions:** Results show that the Swedish translation of IDDSI is of high quality and can be used for improved multidisciplinary communication to optimize dysphagia management. It is anticipated that the user-friendly, patient focused approach of these translated IDDSI resources will improve dysphagia management, particularly benefiting patients and their careers.

**Dysphagia and Motor Symptoms In Parkinson’s Disease: Introduction of the Concept Of Oropharyngeal Freezing**

**Session Title:** Eposter Session G: Physiology and Neurophysiology

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**Introduction:** The pathophysiology of dysphagia in Parkinson’s disease (PD) is heterogeneous and poorly understood at present. This study investigated the phenotypes, prevalence and pathophysiology of oropharyngeal freezing (OPF) in PD and its relation to dysphagia.

**Methods:** In a prospective study, 50 PD patients were systematically screened for OPF using flexible endoscopic evaluation of swallowing (FEES). In addition, FEES videos of 50 patients with post-stroke dysphagia and 50 healthy subjects were retrospectively evaluated as control groups. In PD patients, freezing was assessed with the “freezing of gait (FoG) questionnaire” and the relationship between OPF and FoG was analyzed.

**Results:** In analogy to FoG, signs for OPF presented as either temporarily missing or delayed swallowing reflex in combination with freezing associated movement abnormalities, e.g., festination, trembling, or akinesia. Seventeen PD patients (34%) showed considerable signs for OPF (15 cases of festination, 3 cases of trembling, 3 cases of akinesia). In the patients with post-stroke dysphagia, OPF was detected in 2 patients (4%). The healthy subjects showed no signs for OPF. The distribution of OPF differed significantly between the investigated groups (p = 0.01). PD patients with signs for OPF scored significantly higher in the FoG-questionnaire (12.69 6.37) compared to patients without OPF (7.29 5.17; p = 0.01).

**Conclusion:** Swallowing in PD patients can be impaired by OPF. We suggest that OPF and FoG share common pathophysiologic mechanisms based on their association and similar semiologies.

**Oropharyngeal Dysphagia in Older People is Associated with Reduced Pharyngeal Sensitivity and Low Substance P and CGRP Concentration in Saliva**

**Session Title:** Eposter Session G: Physiology and Neurophysiology

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**Introduction:** Substance P (SP) and CGRP are released by sensory nerve fibers in the oropharynx. Patients with oropharyngeal dysphagia (OD) present reduced oropharyngeal sensitivity and low SP concentration in saliva. We aimed to assess the concentration of salivary SP and CGRP in healthy volunteers (HV), older (> 65 y) people without (HE) and with OD (EOD), and its relationship with pharyngeal sensitivity.

**Materials and Methods:** We included 15 HV, 14 HE and 14 EOD. Swallow function was assessed by videofluoroscopy (VFS). Pharyngeal sensitivity threshold (PST) was assessed by intrapharyngeal electrical stimulation. Hydration, muscular mass, and phase angle (PA) were assessed by bioimpedance. Saliva samples were collected with a Salivette to determine SP and CGRP concentration by ELISA.

**Results:** EOD patients presented impaired safety of swallow (PAS 4.380.77 p=0.0001) vs. HV = 1 and HE = 1.430.51). HE and EOD presented a reduction in intracellular water and saliva volume (HE, 592.86327.9 l, p = 0.0004; EOD, 422.00343.01 l, p = 0.0001 vs HV, 133.3615.91 l, r = 0.6621, p < 0.0001). EOD patients presented an impairment in PST (10.80 3.92 mA vs. HV, 5.74 2.57 mA; p = 0.007) and a reduction in salivary SP (123.8999.34 pg/ml; p = 0.2346) and CGRP levels (24.1724.17 pg/ml vs. HV; 508.18286.29 pg/ml; p = 0.0058). There was a negative correlation between both SP and CGRP concentrations.
and PST \( \left( r = -0.450, p = 0.024; r = -0.4597, p = 0.036 \right) \), respectively, but only SP identified EOD patients with higher PST.

**Conclusions:** EOD patients presented hydropenia and sarcopenia, reduced salivary SP and CGRP concentration, and impaired pharyngeal sensitivity. Our study suggests SP levels in saliva as potential biomarker to monitor pharyngeal sensitivity in EOD patients.

**Electrophysiological Measures of Swallowing Functions: A Systematic Review**

**Session Title:** Epster Session G: Physiology and Neurophysiology

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University Of South Alabama

**Introduction:** Electrophysiological techniques, including EEG and ERPs, are commonly used to evaluate sensory and/or motor functions related to speech, language, and hearing. In recent years, an increasing number of studies have explored the usage of EEG/ERPs to better understand the neural substrates of swallowing. The purpose of a systematic review to assess the utility and application of various EEG/ERP measures within the swallowing literature.

**Method(s):** We searched three electronic databases (PubMed, Scopus, and CINAHL) up to March 2020. Studies assessing the application of EEG/ERPs for swallowing functions were assessed based on inclusion criteria. Each study was assessed for quality and design.

**Result(s):** We included a total of 18 studies assessing swallowing functions using EEG/ERPs. The application is wide and varied ranging from sensory to motor ERPs and advance signal processing images. Eligible articles were evaluated on methodological quality and strength of evidence using “The Oxford Centre for Evidence-based Medicine Levels of Evidence.” Around 72% of studies were case series (level 4), 17% of studies used case-series design (3b), and 11% of studies were low-quality randomized control designs (2b). Further results of data extraction and level of evidence of the eligible studies will be discussed. Additionally, we will discuss the clinical implications of study findings, with the discussion surrounding the application of EEG/ERPs as a novel tool for identifying sensory and cognitive neural processes in swallowing.

**Conclusion:** Electrophysiological measures for swallowing function are having a promising application to understand neural substrates of swallowing functions. There is a need for established protocols for better replication and usability of these study designs.

**Neurophysiological and Perceptual Swallow Responses to Acoustic Properties Associated with Texturally Hard Foods: A Pilot Study**

**Session Title:** Epster Session G: Physiology and Neurophysiology

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The burgeoning notion of eating as a multisensory experience has gained popularity with acoustic properties of food sparking interest in cognitive neuroscience, gastronomical sciences, food marketing and beyond. The effect of food acoustics on behavior and perception has been studied. However, insufficient thought has been given to neurophysiological responses. Our primary objective was to develop a test battery to evaluate the neurophysiological and perceptual swallow responses (including hedonic responses) to acoustic properties associated with texturally hard food. Our secondary objective was to assess the test battery’s feasibility. This study used a descriptive analytical design with a sample of eight healthy adults, recruited using non-probability random sampling. They received a control, and texturally hard food items in the two auditory conditions. Stata 15 and thematic content analysis were used for the quantitative and qualitative analysis, respectively. A qualitative evaluation of the feasibility analysis schedule was conducted. The results revealed an increase in the masked condition (i.e., masked food acoustics), in the first bite force, mastication force, mylohyoid force, duration of palatal elevation, number of masticatory cycles and percentage change in the hyolaryngeal complex excursion. These results were similar to those obtained from the perceptual swallow responses (i.e., perceived more effort/longer duration). Furthermore, all participants reported a positive hedonic response. The test battery has clinical utility and is economically and ergonomically viable based on the logistical parameters of time, cost, equipment, and personnel needs. The test battery is a viable method to evaluate the neurophysiological and perceptual swallow responses (including hedonic responses) to acoustic properties associated with texturally hard food. It could be used as a feasible data collection method and to advise future clinical practice in exploring sound, “the forgotten flavor sense.”

**Validation of the Arabic Version of Swallowing Quality of Life Questionnaire**

**Session Title:** Epster Session H: Screening and Clinical Assessment of OD

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**Introduction:** Dysphagia is a disturbance of the complex sensorimotor functions of swallowing. There are multiple psychosocial consequences associated with swallowing problems such as anxiety, depression, shame, and fear. Therefore, dysphagia has a negative effect on patient’s quality of life. The Swallowing Quality of Life questionnaire (SWAL-QOL) is considered as the first self-report instrument specific to dysphagia. The purpose of this study was to determine the validity and reliability of the Arabic version of SWAL-QOL (ASWAL-QOL) in patients with oropharyngeal dysphagia.

**Materials and Methods:** This was a prospective study. The protocol of this study was approved by the ethics committee in the faculty of medicine, Alexandria University, Egypt. Written informed consent was obtained from all the patients for taking part in the study, a total of 100 patients were included in the study and completed the ASWAL-QOL to determine its psychometrical properties. To test validity: the patients were required to complete the Arabic version of the Dysphagia handicap index (DHI) to test for convergent validity. To test reliability: we used test–retest reliability as well as internal consistency.

**Result(s):** There was strong correlation between the eating desire, eating duration, and food selection in ASWAL-QOL and the functional domain in DHI. This was found as well between mental health and social functioning in ASWAL-QOL and emotional domain in DHI. While checking reliability, most of the domains showed excellent internal consistency reliability and short-term stability.

**Conclusion:** The present study demonstrated that ASWAL-QOL questionnaire is a reliable and valid instrument to measure the effect of swallowing problems on quality of life in patients suffering from oropharyngeal dysphagia. Funding: authors received no funding.
Screening of Oropharyngeal Dysphagia in Adult Patients with Neuromuscular Disease with the Sydney Swallow Questionnaire

Session Title: Eposter Session H: Screening and Clinical Assessment of OD

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Introduction: Healthcare systems worldwide rely on family caregivers. Yet, family caregivers experience increased burden and reduced health and quality of life. Dysphagia is one independent predictor of increased burden; however, we lack guidelines and tools to identify caregivers who require supports to help manage dysphagia. The aim of this study was to develop questions for a dysphagia-related caregiver burden screening tool, the Caregiver Analysis of Reported Experiences with Swallowing Disorders (CARES), and pilot the tool to establish preliminary validity and reliability.

Materials and Methods: The CARES was developed through an iterative process by a multidisciplinary team with expertise in dysphagia, caregiver burden, and questionnaire design. A heterogeneous group of 26 family caregivers (mean age 49.3 ± 7.0 years; 24 females) providing care for individuals with swallowing difficulties completed the CARES, Eating Assessment Tool (EAT-10), IDDSI Functional Diet Scale (IDDSI-FDS), and Zarit Burden Interview (ZBI). Reliability and validity of the CARES were evaluated via Rasch analysis, Cronbach’s alpha, and Spearman’s rho.

Results: The final CARES tool contained 26 items divided across two subscales: Checklist of Behavioral and Functional Changes (Part A) and Measures of Subjective Caregiver Stress (Part B). The majority of questionnaire items fit the model (26/26 INFIT and 22/26 OUTFIT values in the range of 0.5–1.5) and there were significant correlations between the CARES subscale scores and the EAT-10 and ZBI (p < 0.001). There was also evidence of internal consistency across both subscales (alpha coefficients of 0.65 and 0.77 for Part A and B, respectively).

Conclusions: Results support initial validity and reliability of the CARES as a screening tool for dysphagia-related caregiver burden. Future research should consider validation in specific clinical populations and the establishment of cutoff scores for clinical use.

Relationship Between the Spanish Eating Assessment Tool-10 and the Fiberendoscopic Evaluation of Swallowing in Patients with Suspected Oropharyngeal Dysphagia

Session Title: Eposter Session H: Screening and Clinical Assessment of OD

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Introduction: Oropharyngeal dysphagia (OD) is common in the population and may cause severe nutritional and respiratory complications. The aim of our study was determine the accuracy of the Spanish Eating Assessment Tool (EAT-10Spa) for the detection of OD compared with the Flexible Endoscopic Evaluation of Swallowing (FEES) considered as gold standard for the diagnosis of OD.

Materials and Methods: We studied 211 patients with suspected OD. The EAT-10Spa was used to assess self-perception patient scoring of symptoms. The FEES was used to assess impaired efficacy and/or impaired safety of swallow. We used the DOSS scale (Oropharyngeal Dysphagia severity scale) to score FEES findings. The accuracy of the EAT-10Spa was assessed by sensitivity, specificity, and positive (PPV) and negative predictive values (NPV). We test for a correlation between the EAT-10Spa and the DOSS with the Spearman’s correlation coefficient.

Results: 47% of the patients were men, 53% women. The mean age was 68 years. The EAT-10Spa showed 0.96 sensitivity, 0.11 specificity, 0.46 PPV, and 0.76 NPV value for the detection of OD. The percentage of correctly classified patients was 48%. A negative correlation was found between the EAT-10Spa scores and the DOSS score (Spearman’s correlation coefficient = −0.4, p = 0.01).

Discussion/Conclusion: The EAT-10Spa has high sensitivity but low specificity to detect patients with OD. The probability of a low scored questionnaire in a non-dysphagic patient is high, so when we have a score under 3 points for the EAT-10Spa we may avoid further studies for OD. On the other hand, if we have a score over 3 points for the
EAT-10Spa, we cannot ensure that the patient suffers from OD so it will be suitable for more clinical studies for OD diagnosis, such as the Volume-Viscosity Swallow Test (V-VST). If the V-VST shows a high risk of impaired efficacy or safety of swallow invasive, instrumental exploration such as FEES or videofluoroscopy may be considered.

**Does Spanish Eating Assessment Tool-10 have an Adequate Threshold for Detecting Oropharyngeal Dysphagia?**

**Session Title: Eposter Session H: Screening and Clinical Assessment of OD**

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**Introduction:** Oropharyngeal dysphagia (OD) is a common disease with significant mortality and morbidity rates. Spanish Eating Assessment Tool (EAT-10Spa) is one of the most used tests for screening of OD. The aim of our study was determining if EAT-10Spa threshold is appropriate to detect OD based on COR curve results (the test considered suspect OD with at least 3 points). We compared EAT-10Spa results with Flexible Endoscopic Evaluation of Swallowing (FEES), which is considered as gold standard for OD diagnosis.

**Materials and Methods:** We studied 211 patients with suspected OD who made their first visit to a specialized dysphagia clinic and who had not had any previous dysphagia test. To evaluate patient’s self-perception symptoms we use the EAT-10Spa, considering 3 points as suspected OD. The FEES was used to assess swallowing disturbances, using DOSS scale (Oropharyngeal Dysphagia severity scale) to score the findings. We used COR curve to determine the best value for EAT-10Spa based on its sensitivity and specificity.

**Results:** Mean age of patients was 68 ± 16 and 47% were men. 9.4% of patients have no disease, 38.3% have neurological diseases, 18.4% suffer from ENT cancer, and 33.6% have other pathologies not related to dysphagia. The EAT-10Spa (positive test with 3 points) showed 0.96 sensitivity, 0.11 specificity, and 48% of patients were well classified. According to COR curve results, we get very high sensitivity (0.92) and higher specificity (0.39) with a cut point of 8 instead of 3, achieving that 58% of patients are well classified.

**Discussion/Conclusion:** The EAT-10Spa has high sensitivity but low specificity to detect patients with OD. OD dysphagia is an entity that must be detected to avoid the serious complications it produces. Upgrading the EAT-10Spa threshold from 3 to 8 points, we get more specificity without limiting sensitivity. This new point can be used for referring patients directly to OD special units.

**A Systematic and a Scoping Review on the Psychometrics and Clinical Utility of the Volume Viscosity Swallow Test (V-VST) in the Clinical Screening and Assessment of Oropharyngeal Dysphagia**

**Session Title: Eposter Session H: Screening and Clinical Assessment of OD**

**Riera, S; Marín, S; Serra-Prat, M; Tomesen, N; Ortega, O; Clavé, P**

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**Background:** The Volume-Viscosity Swallow Test (V-VST) is a clinical tool for screening and diagnosis of Oropharyngeal dysphagia (OD). Our aim was to examine the clinical utility of the V-VST and to map the V-VST usage across the years since it was described for the first time.

**Methods:** We performed a PRISMA systematic review (SR) and a scoping review (ScR) with articles published from 2008 to May 2020. A meta-analysis was done in the SR to assess the psychometric properties of the V-VST. Quality of studies was assessed by Dutch Cochrane, GRADE (SR), and STROBE (ScR) criteria. PROSPERO registration: CRD42020136252.

**Results:** (a) SR: 5 studies show V-VST has a diagnostic sensitivity for OD of 95.8%; 63% specificity, and an inter-rater reliability Kappa = 0.77. Likelihood ratios for OD were 0.06 (LHR-) and 2.59 (LHR+); and Odds Ratio for OD was 32.91; (b) ScR: 31 studies show the V-VST has been used worldwide to assess OD’s prevalence and complications. Quality of studies show high evidence (SR) and low risk of bias (ScR).

**Conclusions:** The V-VST has strong psychometric properties and valid endpoints for OD in different phenotypes of patients. Our results support its utility in the screening and clinical diagnosis and management of OD.

**Does Clinical Reasoning Matter in the Clinical Swallow Evaluation? A Scoping Review**

**Session Title: Eposter Session H: Screening and Clinical Assessment of OD**

**Pillay, T; Pillay, M**

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**Introduction:** Clinical reasoning is cardinal to the provision of relevant and superior dysphagia assessment, particularly in times of uncertainty (Doeltgen, Attrill, & Murray, 2019). This study explored the phenomenon of clinical reasoning and described it in terms of the clinical swallow evaluation. By exploring the relationship between clinical reasoning and the clinical swallow evaluation, it is possible to modernize the approach to dysphagia assessment by emphasizing the value of this skill in practice. Furthermore, this study aimed to contextualize the results to low-middle-income contexts as they are often poor considered within dysphagia research.

**Materials and Methods:** A scoping review based on the PRISMA-ScR framework was performed to explore the available research. The data were analyzed using thematic analysis.

**Results:** Through rigorous electronic and manual searching, twelve articles were identified (see Fig. 1 below). This review made an argument for the value of clinical reasoning within the clinical swallow evaluation. The results of the study revealed three core themes related to the acquisition, variability, and positive impact of clinical reasoning particularly in the clinical swallow evaluation.

**Discussion:** The results of this review showed that the clinical swallow evaluation is a complex process with significant levels of variability. It demonstrated that healthcare practitioners must depend on clinical reasoning within the clinical swallow evaluation to make appropriate modifications to deliver effective and relevant services despite challenging conditions.
Validation of a Cough Reflex Test and a Water Swallow Test in Detecting Silent Aspiration in Parkinsonism

Session Title: Eposter Session H: Screening and Clinical Assessment of OD

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Introduction: Silent aspiration is a common symptom in Parkinsonism, and is associated with pneumonia and poor outcomes. The aim of this study was to investigate the cough reflex test (CRT) at different stimuli strengths, and a water swallow test (WST), to screen for silent aspiration in patients with Parkinsonism.

Methods: Seventy-six patients were enrolled in the study and 74 completed a battery of CRT, WST and fiberoptic endoscopic evaluation of swallowing (FEES). Cough reflex thresholds were evaluated with nebulized citric acid of different concentrations. The WST was performed with 100 ml water with both pass/fail and swallow efficiency (ml/sec) being evaluated.

Results: Depending on the interpretation of the cough response (any cough versus strong cough response only), the CRT yielded either a high sensitivity or a high specificity. The highest sensitivity (99%) was seen for a combination of CRT (strong cough only as a pass) and WST (swallow speed < 10 ml/sec), at the cost of a low specificity (21%). Sensitivity (68%) and specificity (80%) were optimized for CRT at 0.6 mol/L in combination with WST (pass/fail).

Conclusion: Both the CRT (strong cough only as pass) and the WST (swallow speed < 10 ml/s) can be used alone with confidence of including almost everyone with silent aspiration. However, when combining the tests the most optimal balance of false positives and false negatives with a sensitivity of 68% and a specificity of 80% is reached.

*Poster of Merit*: Voluntary Cough Variability and Airway Invasion in Parkinson’s Disease

Session Title: Eposter Session J: Dysphagia in Neurodegenerative Diseases

Borders, J; Troche, M

Teachers College, Columbia University

Introduction: The relationship between cough airflow and deficits of airway invasion has been identified in multiple patient populations including Parkinson’s Disease (PD). In fact, reduced voluntary cough strength has been identified as a predictor of airway invasion in PD; however, the role of variability of cough function and its relationship with swallowing dysfunction is unknown. The goal of this study was to examine the influence of cough airflow variability on airway invasion in PD.

Materials and Methods: Fifty-eight participants with PD completed spirometric measures of voluntary sequential cough and flexible endoscopic evaluations of swallowing (FEES). Coefficients of variation were used to quantify cough airflow variability. The penetration-aspiration scale and a visual analog scale were used to capture the depth and amount of airway invasion. Proportional odds logistic regressions examined the effect of cough variability on airway invasion. Among aspirators, linear regression examined the relationship between variability and the amount of residue remaining in the subglottis.

Results: Increased variability of cough volume acceleration (p = 0.002) and peak expiratory flow rate (p < 0.001) was associated with an increase in PAS scores, with higher predicted probabilities associated with silent aspiration. Among aspirators, a significant main effect of cough volume acceleration was appreciated for the amount of residue in the subglottis (p = 0.036). For every unit increase in subglottic residue ratings on a visual analog scale, variability increased by 0.85%.
Conclusions: Inconsistent cough effectiveness as measured by variability of PEFR and CVA are associated with increased depth and severity of airway invasion in PD. These results suggest that cough airflow variability may play an important role in the mechanisms of airway invasion among individuals with PD and serve as a therapeutic target for individuals with concomitant cough and swallowing dysfunction.

Abstract

*Poster of Merit*: Characterizing Typical Sip Size in Parkinson’s Disease And Examining Its Relationships with Demographic Factors, Disease Outcomes, And Swallowing Conditions

Session Title: Epoter Session J: Dysphagia in Neurodegenerative Diseases

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Introduction: The typical sip size in people with Parkinson’s disease (PD) is currently unknown. However, characterizing this is necessary for completing standardized, ecologically valid swallowing evaluations. Therefore, the aims of this study were to: (1) characterize sip size in PD; (2) determine if sip sizes change as a function of swallowing condition; and (3) examine the correlations between sip size with demographic factors and disease outcomes.

Methods: People with idiopathic PD were prospectively recruited to complete single, non-cued sips of liquids under four swallowing conditions: thin liquid via cup with no endoscope, thin liquid via cup with an endoscope, thin liquid via straw with an endoscope, and mildly thick liquid via cup with an endoscope. Statistical analyses were used to compare average sip size across the four swallowing conditions. Bivariate correlations were used to examine the relationships between sip size with age, sex, height, weight, body mass index (BMI), disease duration, and disease severity.

Results: Twenty-three people with PD were recruited. Average sip sizes ranged from 20–24 mL across. RM-ANOVA revealed a significant difference in sip size between thin and mildly thick liquids with an endoscope (p < 0.0005)—no other differences were identified. Bivariate correlations demonstrated that sip size was moderately associated with BMI (p = 0.035, R = 0.440).

Conclusions: This study is the first to report typical sip sizes in PD across a variety of swallowing conditions. Results revealed: (1) average sip size in PD is between 20 and 24 mL; (2) sip size does not vary in the presence of an endoscope nor between cup and straw delivery modalities; and (3) changes in sip size were positively associated with BMI. Including 20 mL liquid boluses into standardized swallowing assessments for PD is recommended, as it may increase the ecological validity of the dysphagia evaluation and potentially enhance diagnostic accuracy and intervention planning.

Factors Promoting Dysphagia in Patient with Amyotrophic Lateral Sclerosis

Session Title: Epoter Session J: Dysphagia in Neurodegenerative Diseases

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Introduction: Amyotrophic lateral sclerosis (ALS) is a progressive degenerative disease that involves motor neurons in the primary motor cortex, brainstem, and spinal cord. The median survival ranges from 3 to 5 years after onset. Dysphagia is one of the most important complications encountered in ALS patients. It can appear early in the course of the disease or several months after the onset and exposes patients to many complications, such as malnutrition, dehydration, aspiration pneumonia, or difficulty managing secretions. The aim of this literature review was to determine the factors promoting dysphagia in ALS patient.

Methods: A literature review was performed based on the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. The search strategy was conducted across three databases: Embase, Scopus, and PubMed. The following keywords were used: dysphagia, deglutition disorders, amyotrophic lateral sclerosis, motor neuron disease, and Lou Gehrig disease. The quality index developed by Downs and Black was used to assess the methodological quality and bias of each study.

Results: This review identified 3785 studies. Among them, ten were finally included. It appeared that the site of onset had an important influence on the occurrence of dysphagia. Patients with bulbar onset were more likely to have symptoms of dysphagia. Gender and age were also contributing factors. Women showed earlier and more severe symptoms of dysphagia than men and a more severe degeneration. The later the onset of the disease, the more severe the dysphagia. The mean total score for the quality index was 15.

Conclusions: The results of this literature review highlighted factors contributing to dysphagia in ALS patients such as the bulbar form, being a woman or a late onset. They can help to anticipate and prevent the dysphagia-related complications in these patients as much as possible.

Management of Swallowing Disorders in Huntington Disease in Reference and Competence Centers for Rare Diseases

Session Title: Epoter Session J: Dysphagia in Neurodegenerative Diseases

Cugy, E1; Soudrie, B2; Simonin, C3; Renaud, M4; Ewenczyk, C5; Bellance, R6; Pariente, J7; Verny, C8; Anheim, M9; Goizet, C10

1CH Arcachon; 2AP-HP Hendaye; 3CHRU Lille; 4CHRU Nancy; 5APHP Pitié Salpêtrière; 6CHU Martinique; 7CHU Toulouse; 8CHU Angers; 9CHRU Strasbourg; 10CHU Bordeaux

Introduction: Huntington Disease (HD) is a rare neurodegenerative disorder with a genetic autosomal-dominant inheritance, which first involves basal ganglia (caudate nucleus and putamen). Swallowing disorders can occur in patients at the early stages of the disease and become a major problem in later stages by inducing repeated choking and leading to secondary broncho-pulmonary infections or even cardiac arrest. National Diagnostic and Treatment guidelines were published in August 2015 in France. They recommend regular assessment of swallowing disorders and referral to a Speech and Language Therapist as soon as the disorders appear. The goal of this study is to explore reliability of these guidelines in clinical practice in French Huntington and Neurogenetic Rare Disease Reference Centers (RDRC).

Methods: A questionnaire was send by mail to the 6 Reference Centers for Rare “Huntington Disease” Diseases, 4 Reference Centers for Rare Diseases “Neurogenetic Diseases,” and 14 Competence Centers for Rare Diseases “Huntington Disease.”

Results: Twelve centers responded. Nearly 1850 patients were in the cohort. All centers declared to ask patient or caregiver about swallowing disorders. In some centers (8/12), a dedicated member of the team could explore more over swallowing disorders with specific
questions and clinical test (water test). Only three centers have access to instrumental assessment (videofluoroscopy or nasofibroscopy). For the others centers (3/4), if swallowing disorder is suspected, patient is preferentially address to a Speech and Language Therapist and/or ENT. For severe swallowing disorders, the use of enteral nutrition and subcutaneous hydration are considered and discussed on a case-by-case basis with the patient and the caregivers. All patients with swallowing disorders were referred to a Speech and Language Therapist.

Conclusions: Even different practices, guidelines are applied.

Dysphagia in Alzheimer’s Disease: A Systematic Review

Session Title: Eposter Session J: Dysphagia in Neurodegenerative Diseases

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Introduction: Dysphagia has been described in recent literature as one of the most relevant comorbidities of Alzheimer’s disease. However, few studies on the specific characteristics and progression of dysphagia exist. The aim of this systematic review was to identify the specific characteristics, progression, and prevalence of dysphagia in Alzheimer’s disease.

Materials and Methods: The search was conducted by two independent researchers in March 2020 of published literature from the last 10 years in the PubMed (Medline), EBSCO, ScienceDirect, and BASE databases. A critical appraisal and an evidence level analysis using Joanna Briggs Institute Critical Appraisal and the Effective Public Health Practice Project’s (EPHPP) “Quality Assessment Tool for Quantitative Studies” tools were conducted.

Results: From the search, appraisal, and analysis of the results, 26 studies were eligible for full review. The extracted data suggest that cortical changes occur in the neural swallowing network long before clinical symptoms appear. Dysphagia progresses, as does Alzheimer’s disease, in a continuum, and its severity depends of individual variability. There are a few studies regarding therapeutic approaches for minimizing symptoms and complications. Dysphagia is unequivocally linked to Alzheimer’s disease comorbidities since severe dysphagia leads to malnutrition, dehydration, pneumonia, increases in falls or ulcers, cognitive and behavioral decline, and, even death. Regarding prevalence, the researchers found no studies were published in the last 10 years.

Conclusions: Dysphagia is a complex and important comorbidity in Alzheimer’s disease and has an impact on quality of life and access to and costs of healthcare. Keywords: dysphagia; Alzheimer’s disease; progression; prevalence.

Profiles of Swallowing Physiology in Individuals with Mild Parkinson’s Disease Compared to Healthy Older Adults

Session Title: Eposter Session J: Dysphagia in Neurodegenerative Diseases

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Introduction: Dysphagia is prevalent in Parkinson disease (PD). Despite this, the underlying mechanisms of swallowing impairment have not been thoroughly investigated. The aims of this study were to: (1) identify profiles of swallowing physiology in people with mild PD compared to healthy older adults; and (2) determine how often measures for these groups fall within or outside the interquartile range (IQR) of established young healthy reference data.

Methods: Seventeen adults (4 female) aged 53–86 (mean 69) with mild PD (mean Hoehn & Yahr Scale 2) underwent videofluoroscopy (VF) involving 21 boluses of 20% w/v barium (thin to extremely thick liquid consistency). Data were also collected in 17 age- and-sex-matched healthy adults. Blinded VF rating was completed according to the ASPEKT method. Frequencies of scores outside the healthy young reference IQR were tabulated by group, and odds ratios (ORs) used to compare frequencies between groups.

Results: In both groups, frequencies of high scores (IQR) were 25% for swallow reaction time; laryngeal vestibule closure (LVC) duration; upper esophageal sphincter (UES) opening duration; pharyngeal...
constriction; and residue. Compared to the PD group, the healthy controls showed threefold higher odds of high scores (IQR for sip volume; pharyngeal area at rest; and UES diameter. Conversely, compared to the control group, the PD group showed 1.6-fold higher odds of high scores (IQR for number of swallows/bolus; time-to-LVC; LVC duration; UES opening duration; pharyngeal constriction; and residue.

Conclusion: These results elucidate changes in swallowing in adults with mild PD compared to those seen in healthy aging. Patterns of multiple swallows per bolus and prolonged time-to-LVC were unique to the PD group. Prolonged LVC duration, long UESO duration, poor pharyngeal constriction, and residue were also more common in those with PD. Understanding these profiles of impairment will help to develop mechanistically guided intervention.

The Effect of Bolus Modification on Swallowing in a Heterogeneous Patient Population

Session Title: Eposter Session J: Dysphagia in Neurodegenerative Diseases

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Introduction: Bolus modification is a well-established strategy to manage oropharyngeal dysphagia. However, the precise effects of bolus modification on the physiology of impaired swallowing remain unclear. The aim of this study is to determine the effect of bolus modification on swallowing performance in a heterogeneous population suffering from oropharyngeal dysphagia.

Materials and Methods: An explorative prospective cross-sectional cohort study was performed. Nineteen patients with neurological disease and twenty-eight patients with head and neck cancer were examined via a standardized fiberoptic endoscopic evaluation of swallowing (FEES). In contrast, swallowing efficacy decreased due to an increased propulsion deficit, resistive issue (Fig. 1b).

Conclusion: Dysphagia in MSA is the result of combined motor and sensory alterations. Poor oral control, delayed pharyngeal response, and reduced bolus propulsion seems to be the main pathophysiological mechanisms resulting in an impairment of swallowing safety and efficacy.

Pathophysiological Mechanisms of Dysphagia in Multiple System Atrophy

Session Title: Eposter Session J: Dysphagia in Neurodegenerative Diseases

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Introduction: Dysphagia is a cardinal symptom of Multiple System Atrophy (MSA) and is associated with poor survival. Despite it, pathophysiological mechanisms of dysphagia in MSA are still not clearly understood. The study aims to analyze dysphagia characteristics and related mechanisms in patients with MSA through a fiberoptic endoscopic evaluation of swallowing (FEES).

Methods: FEES recordings of 25 patients with MSA (18 parkinsonian and 7 cerebellar, Hoen&Yahr 4.1±1.1) were retrospectively selected and analyzed. FEES was conducted with liquid (5 ml, 10 ml, 20 ml), semi-solid (5 ml, 10 ml, 20 ml), and solid. FEES recordings were assessed for swallowing safety, using the Penetration–Aspiration Scale (PAS), and for swallowing efficacy, using the Yale Pharyngeal Residue Severity Rating Scale (YPRSRS). Dysphagia pathophysiology was characterized according to a videofiberoptic classification including 6 pathophysiological mechanisms: protective deficit, posterior oral incontinence, delayed pharyngeal phase, oropharyngeal dysphagia, propulsion deficit, resistive issue.

Results: Median PAS scores were 4 (interquartile range—IQR 2–5) for liquid, 2 (IQR 1–2) for semi-solid, and 1 (IQR 1–2) for solid. Median YPRSRS scores were 3 (IQR 2–3) for all consistencies in the valleculae, while were 3 (IQR 2–3) for liquid, 2 (IQR 1–3) for semi-solid, and 1 (IQR 1–2) for solid in the pyriform sinus. Delayed pharyngeal phase, posterior oral incontinence, and propulsion deficit were the main findings (Table 1). Penetration/Aspiration was mainly related to posterior oral incontinence and delayed pharyngeal response (Fig. 1a), while residue was mainly associated with propulsion deficit and resistive issue (Fig. 1b).

Conclusion: Dysphagia in MSA is the result of combined motor and sensory alterations. Poor oral control, delayed pharyngeal response, and reduced bolus propulsion seems to be the main pathophysiological mechanisms resulting in an impairment of swallowing safety and efficacy.

| Table 1 Frequency of pathophysiological detected during FEES |
| Mechanism | n (%) |
| Protectiv deficit | 2 (8%) |
| Posterior oral incontinence | 13 (52%) |
| Delayed pharyngeal phase | 23 (92%) |
| Oropharyngeal dysphagia | 0 (0%) |
| Propulsion deficit | 14 (56%) |
| Resistive issue | 9 (36%) |
Translation and Cross-Cultural Adaptation into Brazilian Portuguese of the SWAL-QOL and SWAL-Care Questionnaires for the Elderly with Neurogenic Oropharyngeal Dysphagia

Session Title: Eposter Session J: Dysphagia in Neurodegenerative Diseases

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Introduction: The Quality of Life in Swallowing Disorders (SWAL-QOL) and Quality of Care in Swallowing Disorders (SWAL-Care) measure the impact of dysphagia on patients’ quality of life and the quality of care they receive. This study aimed to translate and cross-culturally adapt the SWAL-QOL and SWAL-Care into Brazilian Portuguese to the elderly with neurogenic oropharyngeal dysphagia.

Materials and Methods: The research was conducted under the principles of the Declaration of Helsinki and approved by the FOB/USP Research Ethics Committee (CAAE: 38,486,314.5.0000.5417). The first stage consisted of evaluating the operational process of the first version of the SWAL-QOL and SWAL-Care translated into Brazilian Portuguese by Montoni (2009) and validated by Portas (2009). They were applied in five patients with neurogenic oropharyngeal dysphagia and their difficulties of understanding were verified. The translation and cross-cultural adaptation followed the six stages proposed in the guidelines of Beaton et al. (2000).

Results and Discussion: Patients had difficulty understanding 4 domains of SWAL-QOL and questions 7, 8, and 9 of SWAL-Care. In the first stage, two translators prepared one translation each. In the second stage, a synthesis translation was conducted in a meeting between the two translators, a neutral judge, the researcher, and her co-supervisor. In the third stage, two back-translations of the synthesis version into English were performed by two native back-translators. In the fourth stage, the expert panel met, achieving the previous version, which, in the fifth stage, was applied to 10 patients with neurogenic dysphagia. The issues identified as “difficult to understand” or “not applicable” were then reassessed by the expert panel. In stage six, changes were made and the final version was reached.

Conclusion: The translation and cross-cultural adaptation of SWAL-QOL and SWAL-Care were conducted for the elderly with neurogenic dysphagia.

Differences of Management of Diets (Nursing Homes Vs Home) of Patients with Dysphagia Treatment

Session Title: Eposter Session K: Treatment

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Rationale: Modifying oral diets (solid/liquid foods) is the main treatment to reduce complications in patients with dysphagia. The Nutritional Unit Support (UNS) manages the home delivery of commercial thickeners for liquids. As part of an overall adherence study, the differences between home (H) vs. nursing home (NH) in type of diet and thickener use are described.

Methods: Observational study. Telephone interviews to patient or career (4 calls/year). Randomized sample from UNS-database. Variables: age, gender, type of residence; H/NH, indication of thickener (nectar, honey, pudding), type of diet (FOIS scale), type of diet pureed (PD); soft diet (SD); mixed (P&S/D); normal (ND), complete intake (CI), changes in diets, intake of risk foods (RF).
Variety. It would be desirable to adjust diets properly to increase intake and the adjusted type of dysphagia diet being more restricted in NH. According to this study, the place you live determines vs. 52% H), p = 0.000. If we concretize in those with same indication is still significant, ex: nectar; P30.2% H vs. 69.7% NH and ND 34.9% H vs. 0% NH (in fact those at NH with nectar indication had 71.4% PD). There are not many changes in the diet, only 15.7% but there is a significant difference in the amount of PD given in NH 86.1% vs. H 40.2%, p = 0.000. If we concretize in those with same indication is still significant, ex: nectar; P30.2% H vs. 69.7% NH and ND 34.9% H vs. 0% NH (in fact those at NH with nectar indication had 71.4% PD). There are not many changes in the diet, only 15.7% but there is a significant difference in the amount of PD given in NH 86.1% vs. H 40.2%, p = 0.000.

Conclusions: According to this study, the place you live determines the adjusted type of dysphagia diet being more restricted in NH. It would be desirable to adjust diets properly to increase intake and variety.

Altering to Pharyngo-Esophageal Pressures with Effortful Swallow in Adults with Dysphagia: A High-Resolution Manometry Study

Session Title: Eposter Session K: Treatment

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Introduction: Evidence supporting effortful swallowing as a dysphagia intervention is based primarily on videofluoroscopy. Recent high-resolution manometry (HRM) studies have evaluated effortful swallowing in healthy adults. In this study, the effect of effortful swallowing on pharyngeal and esophageal swallowing biomechanics in adults with dysphagia was investigated using HRM.

Methods: Fifteen patients (8 males; age range 45–86) with mixed etiology dysphagia were recruited in an acute teaching hospital. ManoScan HRM equipment with a 4.2 mm pressure catheter was used. The protocol included duplicate 10 ml neutral and 10 ml effortful liquid swallows (IDDSI Level 0) in randomized order. Semi-automated analysis was completed using an online portal (www.swallowgateway.com). Pharyngeal pressure measures were the pharyngeal contractile integral (PhCl), velopharyngeal contractile integral (VCI), mesopharyngeal contractile integral (MCI), hypopharyngeal contractile integral (HPCI), UES relaxation time (UES RT), and UES-integrated relaxation pressure (UES-IRP). Esophageal pressure measures were the proximal esophageal contractile integral (PCI es), distal esophageal contractile integral (DCI), distal latency (DL), and EGI IRP (EGJ IRP4s).

Results: Effortful swallowing resulted in a statistically significant increase in PhCl (p = 0.02). Pressure increases were observed in VCI (p = 0.10), MCI (p = 0.14) and HPCI (p = 0.31) during effortful swallowing. Effortful swallows significantly increased UES RT (p = 0.004). An increase in UES-IRP was noted (p = 0.23). No statistically significant differences were observed in esophageal parameters (PCI es (p = 0.21), DCI (p = 0.31), DL (p = 0.48) and EGI IRP4s (p = 0.14)).

Conclusion: Effortful swallowing induced biomechanical changes in pharyngo-esophageal contractility in adults with dysphagia. While this study contributes to the evidence base supporting effortful swallowing, further studies in specific clinical populations are required.

Exercise-Based Dysphagia Rehabilitation for Adults with Esophageal Cancer: A Systematic Review

Session Title: Eposter Session K: Treatment

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Introduction: Dysphagia is the most common presenting symptom of esophageal cancer and can be exacerbated by chemoradiation and surgery. This systematic review aimed to examine the impact of exercise-based dysphagia rehabilitation on clinical and quality of life outcomes in this population at any time point.

Materials and Methods: 10 databases, 3 clinical trial registries, and relevant conference abstracts were searched from inception to screen all published and non-published studies of any study design. Two independent authors assessed articles for eligibility, complete data extraction, and quality assessment.

Results: Two studies involving 35 participants met inclusion criteria. One case control study allocated 12 participants to the treatment group and 14 to the control group. Swallow prehabilitation resulted in significantly less deterioration of swallow function post-esophagectomy, and rehabilitation following surgery resulted in significant swallow improvements before discharge. Exercises included pursed-lip breathing, tongue exercises, and the Shaker exercise. In the case-series study, 9 participants with ‘aspiration symptoms’ post-esophagectomy participated in swallow rehabilitation, comprising the Mendelson maneuver and super-supraglottic swallow. Following 1 round of rehabilitation, of those participants with no previous relevant dysphagia history, 2/6 continued to present with oral dysphagia and 6/6 presented with pharyngeal dysphagia.

Discussion: The current evidence base for exercise-based dysphagia rehabilitation in patients with esophageal cancer is limited to two studies with high risk of bias and weak study designs. Limited findings suggest that rehabilitation may improve swallow function; however, no reduction in aspiration rates or length of hospital stay durations was found. High quality research investigating the benefit of swallow rehabilitation in this population is needed.

Speech and Language Therapists’ Role in the Treatment of Avoidant Restrictive Food Intake Disorder (ARFID) in Children 0–6; 11 Years (Including Preterm Infants): A Scoping Review

Session Title: Eposter Session K: Treatment

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Background: Avoidant Restrictive Food Intake Disorder (ARFID) is a negative reaction to oral intake, limiting food intake. ARFID may occur with conditions like Autism Spectrum Disorder (ASD) or gastrointestinal issues. ARFID can cause a feeding development plateau, reduced weight, stressful mealtimes, increased hospitalization, and can affect participation and social relationships. Speech and
Language Therapists (SLTs) are the primary providers of Irish feeding and dysphagia services. Most ARFID research has been multidisciplinary (MDT) with a lack of SLT-specific guidance.

Aims: (1) To elucidate the scope of ARFID management in children 0–6 years including preterm infants (2) To identify SLT roles in ARFID management literature (3) To identify techniques used by the MDT that SLTs could implement (4) To contribute to SLT-specific guidelines in ARFID care across multiple settings.

Method: Arsay and O’Malley’s scoping review framework (2005) with Levac et al. enhancements (2010) was used. The PRISMA-SCR was used for reporting. PubMed, Cinahl, Embase, and Cochrane databases were searched for literature. Charting was reviewed by an independent reviewer.

Result: 80 articles were included. Psychologists and SLTs were the most common health professionals (HPs) reported in ARFID care. Management included education, behavioral, sensory, environmental, nutritional, preventative, medical, and physiological techniques. Behavioral management was the most common and was often part of complex interventions. SLTs were involved in assessment and preventative and physiological management. SLT skill mixing was reported particularly with Occupational Therapists. SLTs could employ more behavior and sensory techniques, tube-weaning, education, utensil and texture manipulation.

Conclusion: Behavior management has the most evidence. Psychologists are the main HPs in ARFID care. MDTs are gold standard. SLTs may facilitate more ARFID, community care.

*Poster of Merit*: Does the Presence of a Lingual Pressure Bulb in the Oral Cavity Perturb the Swallow?

Session Title: Eposter Session K: Treatment

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Introduction: Tongue strength declines in healthy aging and is thought to contribute to impaired swallowing safety and efficiency in people with dysphagia. Lingual pressures can be measured using one of several devices involving an air-filled bulb that is placed in the mouth and squeezed against the palate by the tongue. The literature contains data for maximum isometric pressures (MIPs) and saliva swallowing pressures. In some studies, bolus swallowing pressures have also been measured with the pressure bulb in the mouth. Whether the presence of the bulb in the mouth causes alterations in swallowing is unknown. We explored the impact of a tongue pressure bulb on swallows of mildly thick liquids.

Methods: We studied 5 adults within 3 months after a cerebral ischemic stroke, who had reduced anterior MIPs (< 40 kPa). These individuals underwent videofluoroscopy (VF) involving 4 sips of thin liquid, 2 sips of mildly thick liquid, and 2 sips of mildly thick liquid barium with the Iowa Oral Performance Instrument bulb in the mouth, just behind the alveolar ridge. The VF recordings were analyzed by trained raters, blind to participant and task, according to the ASPEKT method.

Results: The presence of the bulb in the mouth resulted in several changes to swallowing compared to the bulb-out condition. An increased frequency of penetration-aspiration was seen in 3/5 patients and associated with significantly longer time-to-laryngeal-vestibule closure. Four patients presented with vallecular residue regardless of bulb condition; the 5th only had vallecular residue with the bulb in. Pharyngeal constriction was better in the bulb-in condition.

Conclusion: Overall, the presence of an air-filled bulb in the mouth resulted in perturbations to the swallow in these patients. Clinicians should exercise caution when collecting swallowing pressure data during swallows of liquid boluses.

Tongue Pressure Resistance Training Post-Stroke: A Case Study

Session Title: Eposter Session K: Treatment

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Introduction: Several studies highlight tongue weakness as a component of post-stroke dysphagia, and suggest lingual resistance training as an intervention. However, outcome studies to date have not controlled for spontaneous recovery. We are currently conducting a randomized control trial of an 8-session lingual resistance training intervention, with either an immediate or 4-week delayed start. Outcomes are measured with videofluoroscopies (VF) at baseline, 4 weeks, and 8 weeks post-enrollment.

Methods: We report data for a single male participant (age 87), enrolled at 21 days post-left MCA ischemic stroke and randomized to the delayed condition.

Results: At baseline, the patient showed reduced maximum isometric pressures (MIPs, 38 kPa), silent aspiration on thin liquids and aspiration on mildly thick liquids. Aspiration was associated with partial laryngeal vestibule closure (LVC) and prolonged time-to-LVC. Additional impaired features of swallowing at baseline were: multiple swallows per bolus, long swallow reaction times, poor pharyngeal constriction, and residue. After the 4-week waiting condition, MIPs remained impaired (33 kPa). Aspiration status had improved to penetration on thin liquids (PAS = 5). Impairments persisted in time-to-LVC, multiple swallows per bolus, swallow reaction time, pharyngeal constriction, and residue. After 8 sessions of lingual resistance, outcomes included improved MIPs (58 kPa) and no penetration-aspiration on any tasks. Improvements were also noted in the integrity and timing of LVC, swallow reaction time, pharyngeal constriction, and residue.

Conclusion: This case study shows how detailed measures of swallowing physiology can be tracked across time in patients recovering from post-stroke dysphagia. The results point to some spontaneous improvements 4-week post-enrollment, but also to further improvements as an outcome of intervention.

*Poster of Merit*: An Examination of the Effects of Menthol Liquids on Swallow Function and Palatability in Young Healthy Adults

Session Title: Eposter Session K: Treatment

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Introduction: Sensory stimulation of swallowing is a novel compensatory strategy in dysphagia management with an emerging evidence base. While the sensorial properties of menthol indicate potential beneficial effects on swallowing, there is a paucity of research in this area. This study aimed to investigate the impact of
menthol liquid (ML) on swallow function compared to non-menthol liquid (NML) in young healthy adults, assess palatability of ML and examine the impact of genetic taste status (GTS) on swallow responses and palatability of ML.

**Method:** Thirty-five young healthy adults were recruited. The protocol included GTS testing and timed water swallow tests of 150 ml room temperature NML and ML samples. Palatability was captured using a hedonic general labeled magnitude scale and participants-provided qualitative comments. Inferential and descriptive statistics were used to analyze the data.

**Results:** Compared to NML, ML resulted in significantly increased mean time per swallow (1.49 0.24 vs 1.62 0.27 s, p = 0.003), decreased mean swallow velocity (16.41 3.56 vs 12.43 3.11, p = 0.000) and reduced mean volume per swallow (24.10 4.97 vs 19.73 4.5 p = 0.000). Palatability ratings of ML ranged from -80 (strong dislike) to +80 (strong like). Mean differences in palatability ratings of NML and ML were not significant. No significant effects of GTS across swallow responses or palatability ratings were found. Supertasters provided more extreme palatability ratings for ML (-80 to +80) compared to nontasters (-40 to + 60).

**Conclusion:** Findings from this study demonstrated modulative effects of ML on the swallow response, which may be attributed to the sensory-stimulating properties of menthol. Wide-ranging palatability ratings highlight the need to consider variability in palatability perceptions. This research provides preliminary evidence to propose the potential use of menthol in the management of dysphagia and sets the basis for future research in this area.

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**Abstract**

The Mechanism Of Action Of Neuromuscular Taping (NMT) on The Masseter Muscle: A Pilot Study Randomized in a Single-Blind with Crossover Design vs. Sham Procedure, with Surface Electromyography

Ramella, B1; Ramella Barbara, R2; Gemma Marco Fabio, G3; Botter Alberto, B4; Brun Marco, B5

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**Introduction:** From a review of the literature, there are no studies demonstrating what is the physiology and/or the mechanism of action that determines the effectiveness of NMT.

**Objective:** a) to verify if this method involves a greater recruitment of the motor units of the muscle being treated b) check whether the increase in the recruitment of motor units depends on phenomena of myoelectric fatigue c) to verify if the NMT can make the subjects vary the consistency of execution of the requested motor task.

**Materials and Methods:** 131 healthy volunteers aged 18 or over were subjected to the measurement protocol that included the registration for each subject of 7 different electromyographic signals.

**Results:** From the analysis of the ARV of the C first group only, there is a significant variation at time T3 vs T0 (P = 0.004), that is when TAPE (NMT technique) B is applied. The analysis of the ARV of the B first group shows a significant variation (P = 0.015) by applying of TAPE B. A comparison of ARV between time points shows a significant variation in T1 vs T0 in the B first group. There is also a significant variation between T3 and T2 in the C first group, that’s when TAPE B is applied. From the comparison of the ARV of the CoV vs baseline, we find a significant variation of the p-value in T2 - T3 and T4 vs T0 both in the complete sample and in the B first group, and a significant variation in T3 vs T0 in the C first group: that is, when TAPE B is placed.

**Conclusions:** From the statistical analysis carried out, we have seen how the application of NMT involves a greater recruitment of the motor units of the muscle being treated in the absence of changes in the phenomena of myoelectric fatigue. Furthermore, the application of NMT seems to make masticatory acts more homogeneous, improving the consistency of the required motor task execution.
EVALUATION WITH SCORES by Marchesan et al., and the tools, are useful in speech therapy practice in Italy, because in Italian literature there was not significant evidence.

Materials and Methods: The project started with the translation of the protocol and the creation of an informed consent, in accordance with the provisions of Helsinki. A first trial was carried out, on 30 patients with OMES, at a dental practice. Then we focused on the use of the tools on Caucasian subjects aged between 18 and 61: at first on 61 physiological subjects, then on 7 with facial palsy.

Results: from the analysis of the result in the physiological sample the lower third, the height and the width of the face, the distance from the angle of the eye to the commissure of the lips and the lower lip, appear greater in the masculine gender, with a statistically significant difference ($p < 0.05$). There is no statistically significant difference in the mandibular movements, but there is a slight decrease in the average amplitude of the movement in subjects over the age of 28. The sensitivity appears to be integral. In the pathological one, in 43%, there is an asymmetry in the measurements of the distance between the angle of the eye and the commissure of the right and left lips, in 29% is detected a difference in the amplitude of the movement of homolateral mandibular lateralization to the compromised side and in 71% an alteration of sensitivity is present.

Conclusion: The use of the tools, in reference to the normative data, appears useful to quantify the extent of the alteration, measuring the OMES and the effectiveness of speech therapy treatment.

*Poster of Merit*: Biofeedback to Improve Swallowing Function in Persons with Dysphagia and Parkinson Disease: An Intervention Study

Session Title: Eposter Session K: Treatment

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Introduction: Biofeedback plays a key role in helping recovery of swallowing function in people with Parkinson’s Disease (PwPD) and dysphagia. This study aimed to verify the use of sEMG swallowing biofeedback and feasibility of a specific treatment protocol in PwPD. Research questions were as follows: Did this biofeedback intervention change penetration/aspiration and/or pharyngeal residue; Did the intervention improve method of oral intake? Did this intervention reduce self-perception of drooling? What was the impact of this intervention on quality of life? Were any potential changes in swallow function maintained at 3 month follow-up? (6) Were there any adverse events? (7) Was sEMG biofeedback intervention acceptable to PwPD?

Methods: 12 participants were recruited, two withdrew pre-intervention. The intervention was 1 h per day, 5 days per week for 4 weeks. It incorporated a progression of swallowing tasks using sEMG biofeedback and based on motor learning and neuroplasticity principles. Instrumental and clinical assessments were carried out at four time points. Qualitative feedback explored acceptance and unexpected effects of intervention.

Results: A statistically significant positive change was evident on oral intake (POIS-H; $p < 0.05$) and salivary and on pharyngeal residue ($p < 0.05$) for solids assessed with FEES. Aspects of quality of life showed improvement ($p < 0.05$). Changes in oral intake and pharyngeal saliva clearance and residue on solids were maintained at 3-month follow-up. The intervention was well tolerated by PwPD and participants reported additional benefits in non-swallowing functions such as voice and cognitive attention. The intervention was well tolerated by PwPD and participants reported additional benefits in non-swallowing functions such as voice and cognitive attention.

Conclusion: This intervention approach is feasible and with some refinement is now ready for a larger scale efficacy study.

Impact of the Type of Diet on Quality of Life of Patients Living at Home vs Nursery Home

Session Title: Eposter Session L: Dysphagia in Geriatric Patients

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Rationale Dysphagia affects basic aspects of life. SwalQoL (SQoL) is a validated test for quality of life in dysphagia. As part of an adherence study to thicker treatment, the SQoL was obtained.

Methods: Telephone interview directly to patient or career. SQoL has 11 sections; swallowing, eating, symptoms, food selection, communication, fears, mental health, fatigue, and social functioning. A Likert scale 1-5 (always, often, sometimes, a little and never) is adjusted and final results are linearly transferred to 0–100 (100 best positive score). Interpretation of results are considered as follows: 0–49 severe impact (SI), 50–70 moderate impact (MI), and 71–100 discrete impact or no impact (DI/NI). Variables are as follows: gender, age, type of residence, home (H)/nursing home (NH), type of diets, pureed (P), soft diet (SD), mixed(P&S/D), normal (ND), and SQoL sections.

Results: 202 patients of 85 [23–103]; IQR:12 years. Mostly women 57.9%. Living at H;43.1%/56.9% NH. SI in QoL affects 19.3%, 59.9% MI and 20.8% DI/NI. The type of diet directly impacts QoL: those with ND have a better QoL than PD (47.4% vs 15.7%, $p = 0.009$). Using less thickener showed a better QoL (DI/NI) (nectar 33.3% vs pudding 10%; $p = 0.002$). Globally there is no difference between gender and H/NH. Analyzing each category by H/NH, there was only significant difference between fears, greater at H 1.58 ± 1.18 vs 2.64 ± 0.76 (NH), $p = 0.00$, and mental health being worse at NH: 2.37 ± 1.20 vs 3.25 ± 0.81 (H), $p = 0.00$. A tendency without significance is observed in differences in food selection 3.23 ± 1.77 (H) vs 2.37 ± 1.20 (NH), $p = 0.05$.

Conclusions: Defining the perception of QoL contributes to a better understanding of patient’s needs. Patients need more information to confront their fears and it is important to adequate the texture for the best use of thickener as it improves their QoL. Surely, it is also needed to increase adaptations of diets and diversity in food selection especially in those living in NH.

Dysphagia Management of End-Of-Life Palliative Care Patients in the Kingdom of Saudi Arabia: A National Survey

Session Title: Eposter Session L: Dysphagia in Geriatric Patients

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Introduction: Speech and language therapists (SLTs) play a vital role in managing dysphagia and in improving the quality of life of patients receiving end-of-life palliative care (EoLPC). There is limited guidance on SLT practices and roles in this field within the Kingdom of Saudi Arabia (KSA). While some international guidelines provide advice on the best practice of SLTs in PC, they are not culturally sensitive to KSA. This study sought to explore the trends in practice,
knowledge, and perceptions of SLTs in KSA toward the management of dysphagia for patients receiving end-of-life palliative care and how different they are than the international recommended practices.

**Materials and Methods:** A cross-sectional, descriptive study was conducted using an online national survey. Respondents were KSA SLTs working with dysphagic patients receiving EoLPC.

**Results and discussion:** Twenty SLTs responded to the survey. Education level, absence of palliative care guidelines, and skill acquisition influenced SLT practices. A higher level of education and more post-qualification training in PC led to greater knowledge and skill acquisition to show higher compliance with international guidelines ($\chi^2 (12) = 16.14, p = 0.04$). SLTs’ involvement in Saudi palliative care services was variable and limited. Cultural differences would interfere with the SLTs decision making for instance family is an important institution in the Muslim faith, patients prefer being having all their family members involved in the provision of their care not one assigned proxy member as practiced in Western countries.

**Conclusion:** SLT lack of education about PC and the absence of national guidelines may affect the quality of dysphagia intervention for terminal ill individuals in KSA. A review of SLT teaching and training programs is required. The production of culturally sensitive national guidelines for EoLPC is urgently required in KSA.

### The Mealtime Experience of Adults with Mental Health Conditions, An Integrative Literature Review

**Session Title:** Eposter Session L: Dysphagia in Geriatric Patients

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**Introduction:** Studies have highlighted the high prevalence of dysphagia and choking in adults with non-organic mental health conditions (Cicala et al., 2019). However, there is scant research considering the personal experience of dysphagia for this population. To understand the evidence base for strategies to involve the service user in recognition, assessment, and treatment of mealtime difficulties, this integrative review synthesized the literature on the experience of dysphagia in patients with mental health conditions.

**Methods:** Two patient groups supported this project co-designing search terms and eligibility criteria for a systematic review of the evidence. Prisma guidance was followed (Moher et al., 2009) in searching five scientific databases. Quality assessment (Sirriyeh et al., 2012) was followed by reflexive thematic analysis (Braun et al., 2019).

**Results:** 31 studies were included for integrative review (Whitemore and Knaff, 2005). These included case reports, literature reviews, and cross-sectional studies. No robust intervention studies were found and quality of evidence was weak. There was scant detail regarding individual mealtime difficulties and the personal experience of dysphagia and of choking. Themes highlighted predominantly medical perspectives, a lack of shared decision making, and paucity of information on the wider consequences of dysphagia in terms of psychosocial aspects for the individual, and the potential impact on relationships with family and staff.

**Conclusion:** NHS England, 2017 recommends a transformation for mental healthcare to promote attention to physical comorbidities and increase inclusivity. Despite the intention for services to move to co-production, the patient voice in this population is rarely described regarding dysphagia. There remains a need for further research into the impact of dysphagia and choking on the person themselves, the indirect effect on others, and the implications for intervention and outcome measures.

### An Exploration of Ethical Frameworks to Guide the Decision Making Process in Eating Drinking and Swallowing for a Person Living with Dementia

**Session Title:** Eposter Session L: Dysphagia in Geriatric Patients

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**Introduction:** The utilitarian approach to ethical decision making under the medical model of care emphasizes doing the most good over the least harm and puts the decision in the hands of the healthcare professional as the expert (Cottone et al. 2000). The rights base approach under the social model of disability puts the person at the center of decision making giving them power and control over their life choices and decisions (Clarke 2015). This is a case study on TJ who has a diagnosis of Parkinson’s disease, dementia, low mood, severe dysphagia with a PEG in situ. Post-admission to the acute hospital with aspiration pneumonia, TJ was discharged to a nursing home with recommendations of nil by mouth and was refer to the community outreach speech and language therapist and geriatrician for decision making around oral feeding.

**Methods:** The two contrasting approaches were examined in relation to this case. If applied, the utilitarian approach could result in TJ remaining nil by mouth, keeping him medically well but avoiding the quality of life (QOL) component of eating, drinking and swallowing. Under the rights-based model, the PANEL principles (Genio 2015) and the Nuffield Council on Bioethics (2009) framework were applied. They emphasize a case-based approach with the importance of the individual’s participation, accountability of healthcare professional to ensure the person’s civil and legal rights are upheld, non-discrimination, and a palliative approach to care.

**Results:** The rights-based approach was applied. TJ made the decision that he wanted to eat and drink for QOL. He completed an advanced care plan and requested no further hospital admissions. Reported outcomes include improved mood, improved socialization at mealtimes, and a sense of control over his life. Nurses reported increase satisfaction that they were providing better quality care.

**Conclusions:** These ethical frameworks can be used by teams to guide other ethical decisions in dysphagia and dementia care.

### Education about Dysphagia for Healthcare Providers in Nursing Homes

**Session Title:** Eposter Session L: Dysphagia in Geriatric Patients

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**Introduction:** Dysphagia is a life threatening problem in elderlies. Studies showed that 13.4–60% residents in nursing homes are prone to dysphagia. Despite the burden of dysphagia in nursing homes, it is under-recognized and the patients receive inefficient care. Loss of knowledge in this domain can be one of the factors for this problem. The aim of this study is to investigate the effect of dysphagia education in improving the knowledge of healthcare providers who work in nursing homes.

**Methods:** Thirty-three participants completed a researcher made validated and reliable questionnaire before and after education. The
questionnaire comprised of 2 main parts (The demographic part, and the knowledge part which comprised of 31 questions about: basic knowledge about swallowing and dysphagia, diagnosis/ assessment and treatment in dysphagia). The education was accomplished in one day (8 h).

**Results:** All of the participants were the personnel of nursing homes who fed elderlies or helped them. Most of them had no education about dysphagia at university (69.7%) or even in the last 10 years at work (72.7%). Most of them (72.7%) were unaware that the aging could be a risk factor for dysphagia. Only 27.4% of participants reported that they had patients with dysphagia during their work experience. The pre-education mean score was 8.58 (±3.74) while the post-education mean score was 17.00 (±3.66). There was a significant average difference between the pre- and post-education scores (t33 = 11.59, p < 0.0005).

**Conclusion:** According to data, there is a doubt that these participants can diagnose and or treat dysphagia properly or not. Education about dysphagia will improve the knowledge significantly. Improving the knowledge has the potential to better diagnosis and improving the quality of care for patients. It is recommended to investigate the role of increasing knowledge to improve the quality of care in future.

*Poster of Merit*: Milestones in the Transition from Non-Oral Feeding to Oral Feeding in Preterm Infants: A Scoping Review

**Session Title:** Eposter Session M: Dysphagia in Children

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**Introduction:** Achieving safe and effective swallowing is a crucial skill that premature infants must attain prior to hospital discharge. The literature is heterogeneous on the topic and frequently clinicians encounter difficulties in making effective decisions. This scoping review explored how the literature describes and assesses the developmental trajectory of swallowing in premature infants as they progress from non-oral to complete oral feeding.

**Material and Methods:** Levac et al. [1] and the Prisma-Scr [2] frameworks were followed. Nine databases (MEDLINE, Cochrane Library, EMBASE, CINAHL, Web of Science, Scopus, Amed, European Society of Swallowing Disorders, and ProQuest Databases) were searched (inception-December 2019). Two independent authors screened titles, abstracts, and full-texts, and extracted data. No publication date, design, or language restrictions were imposed. Eligible studies described the complete swallowing development (from enteral to full oral feeding) in preterm infants (<37 weeks of gestation). The CCAT tool [3] was used to assess methodological quality.

**Results:** The initial search yielded 6585 results, with 13 heterogeneous studies ultimately included. To describe the swallowing trajectory, 1 article (7.6%) selected a validated scale, while 10 (76.9%) utilized temporal measurements (i.e., postmenstrual age (PMA), chronological age). 2 sources (15.2%) did not specify assessment methods. Overall, 17 heterogeneous milestones were identified. More than 50% of results agreed on four main steps (mean PMAds): start of enteral feeding achieved at 29.42±1.9ws, complete enteral feeding at 32.39±1.82ws, day of first feed at 32.77±1.3ws and oral feeding completed at 36.03±1.99ws.

**Conclusion:** The results indicate that the full swallowing trajectory is reported heterogeneously in the available literature. A low level of agreement was noted in the assessment procedures and in the milestones' definitions, with a potential impact on practice and research.
Challenges and Opportunities for a Pediatric Aerodigestive Program in Saudi Arabia: A National Survey

Session Title: Eposter Session M: Dysphagia in Children

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Introduction: Feeding and swallowing difficulties are commonly presented in children with aerodigestive disorders. Managing the disorders’ presentations and symptoms requires the involvement of numerous healthcare specialists, including speech-language therapists (SLTs). The need for coordinated interdisciplinary care led to development of pediatric aerodigestive programs (PAP) across the United States. There are no comparable programs in Saudi Arabia (SA). Evidence for their effectiveness is promising but it is unknown if adapting PAP to other countries will lead to similar outcomes. This study explored the challenges and opportunities of delivering a PAP in SA. The research questions were: (1) what are SLTs’ current practices and perceptions of pediatric aerodigestive care in SA? (2) what are SLTs’ perceptions of barriers and facilitators associated with implementing a PAP in SA?

Materials and Methods: A web-based survey (Qualtrics) was used. Participants included SLTs working in SA. Data collection took place between February and April 2020.

Results: 72 SLTs responded to the survey. Respondents showed variable practice in pediatric aerodigestive care. The majority believed in the positive impact of implementing a PAP. The top three ranked barriers were as follows: (1) lack of experienced clinicians for pediatric patients with dysphagia; (2) non-availability of training and supervision in providing aerodigestive care; (3) lack of support from other multidisciplinary teams. The top three facilitators were as follows: (1) following an established guideline; (2) organizational support; and (3) acknowledgment of each specialty’s role.

Conclusion: This study contributes to a better understanding of factors influencing the implementation of a PAP in SA. By aiding the implementation of such a program, the research findings may improve the care of children with feeding and swallowing problems in SA.

Assessment of Swallowing Disorders, Nutritional and Hydration Status, and Oral Hygiene in a School with Children with Severe Neurological Disabilities Including Cerebral Palsy

Session Title: Eposter Session M: Dysphagia in Children

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Background: Special needs schools (SNS) include children and young people with major neurological disabilities or cerebral palsy (CP) at high risk of oropharyngeal dysphagia (OD) and malnutrition (MN). We aimed to assess the prevalence of eating and swallowing disorders, MN, dehydration (DH), and oral health (OH) in students with severe neurological disability (ND).

Methods: A cross-sectional, observational study was conducted in an SNS. Assessments included: a) demographics, health status, comorbidities and gross motor function classification system (GMFCS); b) swallowing function (V-VST), oral-motor evaluation and masticatory capacity (EDACS), c) nutritional and dehydration status (anthropometry, bioimpedance and dietary records) and d) oral health status according Oral Hygiene Index Simplified (OHISe).

Results: A total of 33 students were included. Main diagnosis was cerebral palsy (57.6%), hereditary diseases (15.2%), and epileptic encephalopathy (12.1%). During the previous year, ten of these children required visits to emergency department and eight required hospital admission. 38.7% of students were classified as level V based on GMFCS, and 33.3% required percutaneous endoscopic gastrostomy. More than 60% presented level III of EDACS. Based on V-VST, 90% presented signs of impaired safety of swallow and 70%, signs of impaired efficacy. Prevalence of overall MN was 60%, 89.3% of chronic MN and 21.42% acute MN (Table 1). Low muscle mass was

| Nutritional status assessment, n (%) | Total, n (%) | Children (5–12 years), n | Teenager and young people (12–23 years), n |
|-----------------------------------|-------------|--------------------------|------------------------------------------|
| Mean of GMFL                       | 3.77        | 3.8                      | 3.7                                      |
| Weight-for-age z-score (WAZ) (Overall NS) n = 10 |             |                          |                                          |
| Overnutrition (≥ + 2SD)            | 0           | 0                        | –                                        |
| Normal (+ 2SD to -2SD)             | 4 (40%)     | 4                        | –                                        |
| Moderate undernutrition (< -2SD to 3SD) | 3 (30%)   | 3                        | –                                        |
| Severe undernutrition (< -3SD)     | 3 (30%)     | 3                        | –                                        |
| Height-for-age z-score (HAZ) (Chronic MN) n = 28 |             |                          |                                          |
| Overnutrition                      | 0           | 0                        | 0                                        |
| Normal                             | 3 (10.71%)  | 2                        | 1                                        |
| Moderate undernutrition            | 4 (14.28%)  | 3                        | 1                                        |
| Severe undernutrition              | 21 (75%)    | 10                       | 11                                       |
| BMI z-score (BAZ) (Acute MN) n = 28 |             |                          |                                          |
| Overnutrition                      | 2 (7.14%)   | 1                        | 0                                        |
| Normal                             | 20 (71.42%) | 7                        | 7                                        |
| Moderate undernutrition            | 3 (10.71%)  | 0                        | 2                                        |
| Severe undernutrition              | 3 (10.71%)  | 0                        | 1                                        |
present in more than 80% of children and more than 65% had high percentage of body fat and intracellular DH and OH was poor. **Conclusion:** MN, DH, and OD are severe conditions and may be highly prevalent in schools with students with severe ND and CP and must be managed through nutritional and compensatory strategies to allow appropriate physical and cognitive development and improve clinical outcomes. A dietetic-educational intervention on OD, MN, and OH is mandatory to improve the clinical outcome in students at SNS.

**Poster of Merit**: **Mealtime Structure and Control of Food Intake in Healthy Children and Children with Gastrointestinal Diseases**

Session Title: Epster Session M: Dysphagia in Children

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**Introduction:** Feeding and swallowing problems in children often have multifactorial causes, including an organic and a behavioral component. Factors related to the feeding environment and its impact on child’s eating behavior are important. The aim of this study was to investigate the mealtime structure and environment of healthy children and children with gastrointestinal diseases (GID).

**Materials and Methods:** cross-sectional case–control study. The samples consisted of 787 healthy (mean age 4.91 ± 1.00) and 141 children with GID (mean age 4.18 ± 1.28). Parents were asked to provide data on demographics and describe mealtime structure and environment by answering to 24 closed-ended questions.

**Results:** The majority of the children had the same amount of meals every day (86.1% of healthy and 87.9% of clinical group) and at the same hour (95.3% of healthy and 94.3% of clinical group). Parents of both groups exhibited high control of the child’s food intake by deciding both when (76.1% of healthy and 70% of clinical group), and what their child eats (84.8% of healthy and 81.9% of clinical group). Almost one third of the parents also decided how much their child eats (35.7% of healthy children, 37.6% of clinical group).

Children with GID were found to be less autonomous during feeding (p < 0.001), less likely to express hunger (p < 0.01), to eat the same food with their family (p < 0.001) and sit at the table during meals (p < 0.01). Instead, they are more likely to watch TV (p < 0.01) or take along toys during meals (p < 0.05).

**Discussion/Conclusion:** The study showed that both groups provided structured and consistent mealtime environment. However, a significant proportion of children did not control how much they eat which might impede their ability to self-regulate eating. The presence of a structured and consistent mealtime environment. However, a significant proportion of children did not control how much they eat which might impede their ability to self-regulate eating. The presence of a stable medical condition under long-term treatment with intravenous immunoglobulin (IVIg) every five weeks for more than seven years. During an appointment that took place six weeks and five days after the last IVIg therapy, the therapy interval was extended for the first time. On admission, clinical examination revealed the patients formerly known symptoms including tetraparesis with emphasis on distal muscles, myotonic posture of the hands and dysarthria. For the first time, the patient also reported an increasing dyspnea and a slight inspiratory stridor. IVIg therapy was applied on day one and was well tolerated by the patient. Nevertheless during the following night, inspiratory stridor significantly worsened, the patient was tachypnoeic and needed nasal oxygen supply. There were no signs of an allergic reaction to IVIg, or IgA deficiency as underlying cause. The patient was transferred to the intensive care unit (ICU), where a flexible endoscopic evaluation of swallowing (FEES) revealed a bilateral vocal cord palsy. The patient had to be intubated and tracheostomized because of acute respiratory distress. After restarting treatment with IVIG, 18 days into ventilation, vocal cord palsy rapidly improved allowing for subsequent decannulation.

**Conclusions:** This case report provides evidence that IVIg therapy may be effective for the treatment of cranial nerve symptoms in CIDP. It also emphasizes how critical timely IVIg therapy can be for adequate symptom control.

**Poster of Merit**: **An International Survey to Determine the Prevalence, Implementation, and Healthcare Professionals’ Opinions of Above Cuff Vocalization**

Session Title: Epster Session N: Dysphagia in Critical Care/Complications of OD

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**Introduction:** Above cuff vocalization (ACV) involves application of an airflow, via the subglottic port of a tracheostomy, through the larynx to facilitate vocalization and restore laryngopharyngeal sensation. Despite being used for 50 years [1], there is limited research in this area indicating potential benefits for communication [2–4], swallowing [2,5,6], cough [2], and quality of life [7]. This study explored extent of ACV use, its implementation, and opinions of healthcare professionals (HCPs).

**Methods:** Ethical approval was obtained (MREC: 18-037). An international online survey was disseminated May–November 2019 via social media and professional networks. Topics included: tracheostomy management, prevalence, practicalities, barriers, resource use, and experiences and opinions.

**Results:** The survey was completed by 244 HCPs, with one exclusion, from 9 different HCP groups, from 25 countries. The dissemination strategy precludes reporting of response rate. ACV was used in the clinical area of 94 HCPs (39%). More than 40% used standard operating procedures, guidelines, or staff competencies. Most HCPs stated staff training is required prior to assessing for (n = 86; 93%), or delivering (n = 92; 99%), ACV; but this occurs only in 36% (n = 33) and 47% (n = 44), respectively. ACV implementation varied widely (Table 1).
The top 4 benefits reported were: communication (n = 76; 82%), mood (n = 62; 67%), laryngeal sensation (n = 49; 53%), and swallowing frequency (n = 43; 46%) (Fig. 1). Extreme barriers to implementation included lack of access to knowledgeable staff (n = 92; 38%), lack of access to training (n = 73; 30%), and not using tubes with subglottic ports (n = 74; 31%).

**Conclusions:** There is no standardized approach to ACV delivery and limited implementation of staff training. This may be contributing to the wide variety of opinions on approaches and benefits. Further research is needed to explore patient and HCP opinions of ACV and establish optimal implementation.

### Table 1 – Variety of above cuff vocalisation (ACV) implementation approaches

| ACV Implementation                      | N  | %    |
|-----------------------------------------|----|------|
| **Earliest introduction of ACV**        |    |      |
| 0-24 hrs                                | 3  | 3.2% |
| 25-48 hrs                               | 10 | 10.8%|
| 49-72 hrs                               | 14 | 15.1%|
| >72 hrs                                 | 45 | 48.4%|
| Don’t know                              | 21 | 22.6%|
| **Total number of responses**           | 93 |      |
| **Type of air used**                    |    |      |
| Humidified oxygen                       | 14 | 15.1%|
| Non-humidified oxygen                   | 45 | 48.4%|
| Medical air                             | 25 | 26.9%|
| Don’t know                              | 9  | 9.7% |
| **Total number of responses**           | 93 |      |
| **Airflow delivery**                    |    |      |
| Intermittent                            | 28 | 30.1%|
| Continuous                              | 34 | 36.6%|
| Both intermittent and continuous (with equal frequency) | 3  | 3.2% |
| Both intermittent and continuous (with intermittent used more frequently) | 9  | 9.7% |
| Both intermittent and continuous (with continuous used more frequently) | 9  | 9.7% |
| Don’t know                              | 10 | 10.8%|
| **Total number of responses**           | 93 |      |
| **Upper airflow limit**                 |    |      |
| <15 mins                                | 7  | 38.9%|
| 15-30 mins                              | 3  | 16.7%|
| 31-60 mins                              | 4  | 22.2%|
| 61-90 mins                              | 0  | 0.0% |
| 91-120 mins                             | 1  | 5.6% |
| >120 mins                               | 0  | 0.0% |
| Don’t know                              | 2  | 11.1%|
| No response                             | 1  | 5.6% |
| **Total number of responses**           | 93 |      |
| **Typical daily duration of airflow per day** |    |      |
| <15 mins                                | 27 | 29.0%|
| 15-30 mins                              | 21 | 22.6%|
| 31-60 mins                              | 9  | 9.7% |
| 61-90 mins                              | 3  | 3.2% |
| 91-120 mins                             | 2  | 2.2% |
| >120 mins                               | 4  | 4.3% |
| Don’t know                              | 27 | 29.0%|
| **Total number of responses**           | 93 |      |
| **Typical number of days duration having ACV** |    |      |
| ≤1 day                                  | 1  | 1.1% |
| 2-5 days                                | 19 | 20.4%|
| 6-7 days                                | 4  | 4.3% |
| 1-4 weeks                               | 13 | 14.0%|
| >1 month                                | 3  | 3.2% |
| ongoing (e.g. long-term tracheostomy)   | 18 | 19.4%|
| Don’t know                              | 33 | 35.5%|
| No response                             | 2  | 2.2% |
| **Total number of responses**           | 93 |      |
Supportive Care Needs of Persons with Oropharyngeal Dysphagia and Their Caregivers: A Scoping Review

Session Title: Epoter Session N: Dysphagia in Critical Care/Complications of OD

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Introduction: Besides affecting physical health, Oropharyngeal Dysphagia (OD) entails limitations in daily activities and social participation for both patients and their informal caregivers. OD-related needs were, however, seldom investigated, despite their relevance for developing effective interventions. A useful tool to categorize disease-related needs and design service delivery is the Supportive Care Framework (SCF), implemented in relation to various pathological conditions, but never to OD. The aim of this study was thus to map the supportive care needs of adults with OD and their informal caregivers and to classify them through the SCF.

Materials and Methods: A scoping review was conducted to identify studies investigating the needs of patients with OD and their caregivers, using five electronic databases (PubMed, Embase, PsycINFO, Wiley Cochrane Library, Cinahl) and reference list searching. Two independent raters assessed studies’ eligibility and extracted data; a third rater was involved in conflict resolution. A Best fit framework synthesis approach was used to report the findings.

Results: The search identified 2370 records; 12 studies (11 qualitative and 1 quantitative) were included in the review (Fig. 1). Only 3 studies addressed caregivers’ perspective. Based on SCF, psychological and informational needs were primarily quoted, together accounting for 55% of patients’ and caregivers’ answers, whereas practical, social, and physical needs were less represented. Only patients reported emotional needs, while spiritual needs were not cited.

Conclusions: There is a dearth of research on the care needs of patients with OD and their caregivers. The few studies addressing this topic have identified personal and social needs besides physical ones, thus highlighting the manifold impact of OD. More comprehensive studies are required in this domain, in order to design interventions effectively targeting patients’ and caregivers’ needs.

Exploring Correlations Between Swallowing Perceptions and Salivary Biomarkers in Sjogren’s Syndrome

Session Title: Epoter Session N: Dysphagia in Critical Care/Complications of OD

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Introduction: Sjogren’s syndrome (SS) is an autoimmune disorder characterized by salivary changes affecting swallowing and life quality. To date, no study has explored the relationship between swallowing perceptions and salivary biomarkers in SS.

Methods: To explore correlations between swallowing perceptions and salivary biomarkers in those with and without SS, we used a prospective case–control pilot design. We assessed perceptions using the SWAL-QOL (swallowing quality of life questionnaire) and Clinical Oral Dryness Score (CODS). Using unstimulated and stimulated saliva sampling, we measured 1) total protein content, and conducted 2) sialometric (flow rate) and 3) sialochemical (-amylase, cortisol, C-reactive protein [CRP], mucins) analyses, comparing groups using t-tests or Mann–Whitney U. Across participants, we assessed correlations between perceptual and salivary data using Pearson’s r.

Results: Over 13 weeks, we enrolled 12 (N) participants (n1 [cases] = 6; n2 [controls] = 6). SWAL-QOL scores differed significantly between groups (p = 0.004), though CODS did not. When compared to controls, those with SS had lower flow rate (p = 0.003) and higher total protein, cortisol, and CRP (p < 0.02). Across participants, significant correlations (Fig. 1) included swallowing perceptions with total protein (r = -0.81, p = 0.001) and -amylase (r = -0.83, p = 0.001); and oral dryness with flow rate (r = -0.63, p = 0.03), total protein (r = 0.77, p = 0.003), and -amylase (r = 0.83, p = 0.001). Cortisol and CRP did not correlate with perceptions.

Conclusion: We have identified novel correlations between swallowing perceptions and salivary biomarkers in those with and without SS. Salivary changes in SS appear to be associated with oral dryness severity and perceived dysphagia, and altered autonomic function associated with elevated stress (cortisol) and inflammation (CRP).
have highlighted saliva’s role in swallowing perception, specifically biomarkers with lubricative properties.

**Poster of Merit**: Perspectives on the Role of Speech and Language Therapists Working with Dysphagia in National Critical Care Settings: A Qualitative Study

**Session Title**: Eposter Session N: Dysphagia in Critical Care/Complications of OD

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**Introduction**: Little is known about clinical practices and service provision for speech and language therapists (SLTs) working in dysphagia in Irish critical care (CC) units. This is reflected in the lack of national guidance for SLTs working in CC. This study aimed to explore facilitators and barriers to clinical practice in this area to inform ongoing professional development. A national survey was already completed but more specific information was required.

**Methods**: Qualitative methods were used, specifically a national focus group. Participants were SLTs working in the area of dysphagia in adult CC in Ireland within the previous 3 years. SLTs from

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**Fig. 1** Image depicting correlations between salivary, CODS, SWAL-QOL data across study participants. Comparisons made using Pearson product-moment correlation. Positive (+) and negative (−) significant correlations indicate \( p < 0.05 \) for \( r > 0 \) and \( r < 0 \), respectively. \( \alpha \)-amylase = alpha-amylase, CODS = Clinical Oral Dryness Score, CRP = C-reactive protein, MUC5B = mucin 5B
different academic teaching (N = 4) and regional (N = 2) hospitals participated. The focus group was guided by an interview schedule, audio-recorded and later transcribed verbatim. Analysis of the transcript was completed using a technique based on Attride-Stirling’s (1) thematic networks and Braun and Clarke’s (2) six phases of analysis. Results: 4 global themes emerged from the analysis, each with a number of associated organizing and basic themes (Fig. 1). The main findings were: 1. There are service-specific differences in practices across disciplines, resources, referral procedures, and patient factors. 2. The CC environment lends itself to continuous learning and teaching but SLTs acknowledged that learning is not easy and takes time. 3. SLTs suggested barriers to best practice at a national, service and clinician level. 4. SLTs believed they must fight to become recognized as a valued, integral member of their CC team with adequate resources. Despite obstacles, SLTs believed they have the resilience to keep advocating for their role.

Conclusion: Findings highlight a lack of adequate SLT staffing levels, appropriate training, clinical resources, and national guidelines to direct management and intervention in CC. This is significant in this COVID-19 era. We provide directions for further work in this area.

Correlating Muscle Resection with Functional Swallow Outcomes: An Anatomic Framework Informed Comprehensive Review of the Literature

Session Title: Eposter Session P: Dysphagia After HNC Treatment

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Introduction: Little is known about how resection of certain muscles correlates with functional outcomes in head neck cancer (HNC) surgery patients. The objective was to perform a systematic review of studies reporting swallow-associated outcomes in patients who received HNC surgery. An anatomic and physiologic framework of swallowing (Pearson’s dual-sling model) informed the study design and assessment of outcomes.

Materials and Methods: PUBMED and Google Scholar databases were searched for peer reviewed papers published between 1990 and 2019 using relevant medical subject heading (MeSH) terms. Exclusion criteria were 1) discussion comparing reconstruction techniques, 2) case report/series (n < 10), 3) perspective articles, 4) papers comparing objective instrumental methods of swallowing evaluation, 5) animal/cadaver studies, and 6) no instrumental or validated swallow assessment tools used. Two investigators reviewed all papers meeting the inclusion/exclusions criteria. Muscles resected, anatomic resection site, swallow outcomes, and patient treatment variables were collected.

Results: A total of 89,856 peer reviewed papers were identified. Fifty-four were relevant to this review, of which 18 papers met all inclusion and exclusion criteria. None discussed their impact on swallowing within the anatomic and physiologic framework of the dual-sling mechanism. The majority of papers discussed how greater extent of tongue base or supraglottic resection impacted swallow outcome, or how tumor resection within general anatomic regions impacted swallowing. Assessment of swallow function varied greatly between studies.

Conclusion: To date, no surgical HNC studies have used the dual-sling mechanism of swallowing as a framework to guide study design, and outcome assessment has been inconsistent. To counsel patients effectively on post-surgical swallow outcomes, research that properly
it correlates muscles resected with consistently evaluated functional outcomes is needed.

**Trends in Reporting Swallowing Outcomes as Adverse Event in Radiotherapy Clinical Trials for Head and Neck Cancer: A Bibliographic Review**

**Session Title: Eposter Session P: Dysphagia After HNC Treatment**

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**Objective**: A deficiency identified in the research report is the insufficiency in the description of adverse effects in clinical trials, they must estimate the efficacy and toxicity of the interventions to provide a complete perspective of the real treatment. One of the most frequent and important side effects of radiotherapy for head and neck cancer is swallowing disorders.

**Method**: A replicable review was conducted in ClinicalTrials.gov database for trials on 01 August 2019 that had a primary completion date before 1 January 2015. The inclusion criteria used included (1) Study type: interventional studies, (2) Interventions: radiotherapy as standard treatment or primary focus in oncology, (3) Phase: phase 3; phase 4, (4) full text retrievable, and (5) cancer subtype: head and neck cancer.

**Results**: 583 unique studies were identified, and 40 were analyzed. 72.5% studies report dysphagia as a potential adverse event. Only 47.5% used a subjective assessment and 2.5% used an objective assessment. 7.5% of the studies took into account an assessment before and after radiotherapy.

**Conclusion**: The quality of reporting dysphagia as an adverse effect in radiotherapy studies for head and neck cancer should be improved if a better safety assessment is desired, allowing for a more balanced balance between the benefits and risks.

**Patient’s Perception and Physiological Assessment of Dysphagia in Oropharyngeal Cancer: The Art of Statement**

**Session Title: Eposter Session P: Dysphagia After HNC Treatment**

**Vieira, D**; **Sousa, E**; **Monteiro, E**; **Dinis-Ribeiro, M**

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**Introduction**: Patients treated for oropharyngeal (OP) cancer can experience a compromise of swallowing. Despite the patient’s perception and the physiological assessment continuing to be explored, the published articles generally focus on one of these themes. But, for better adherence to treatment protocols and the development of educational programs is important to understand the relationship between these two key points. Thus, we perform a systematic review, studying the relationship between the patient’s perception and physiological assessment of dysphagia in OP cancer.

**Materials and Methods**: Two independent reviewers using the electronic database PubMed performed a systematic review, following PRISMA statement. All articles with humans, of the last 5 years, up to June 2020, based on PICO strategy were included.

**Results**: Of the 5476 abstracts, none met de inclusion criteria defined. So, we decide to explore the articles about patient’s perception and swallowing physiology that include OP cancer patients—we found 6 papers. The patient’s perception was assessed by different instruments. The instrumental assessments based on videofluoroscopy swallowing study and fiberoptic endoscopic evaluation of swallowing. The results of the selected articles show significant association between physician and patient scored dysphagia perception, and with the risk of dysphagia through VFSS. On the other hand, the bolus interferes in patient’s awareness of swallowing difficulty and in swallowing physiology, but there is no correlation between them.

**Discussion/Conclusion**: With this systematic review, we conclude the results aren’t consistent, and more systematic and profound studies are necessary to better understand this relation. In this way, we are going to have an overview, that result from the combination of patient’s awareness and physiology, that could help a multidisciplinary healthcare team, for better treatment and understanding of the impact in the swallowing function.

**“Just Being Alive was a Struggle Each Day”**: A Qualitative Investigation of the Lived Experience of Oral Stage Dysphagia in Adults with Rheumatoid Arthritis Affecting the Temporomandibular Joint

**Session Title: Eposter Session P: Dysphagia After HNC Treatment**

**Gilheaney, O; Walsh, I**

**TCD**

**Introduction**: Rheumatoid arthritis (RA) is a multi-system autoimmune disorder affecting 1–3% of adults globally [1, 2]. RA affects the jaw joint in up to 93% of patients, causing temporomandibular disorders (TMDs) [3–7]. RA-related TMDs can result in oral stage dysphagia (OD), with impaired mastication (31%) and swallowing (25%), and masticatory pain (36%) and fatigue (21%) [8]. However, research on the development or impact of these problems is sparse and management may be limited with patients experiencing reduced quality of life. Therefore, this study explored the lived experience of adults with RA who experience TMD-related OD, through written online accounts.

**Materials and Methods**: A quasi-observational qualitative study was conducted with data collected from comments on a popular online website regarding descriptions of the lived experience of patients with RA. Thematic analysis techniques with inductive and deductive methods were used to manually analyze the data [9]. Data from an 8-year period (since inception of the forum) were collected, with 47 individual accounts included (6287 words).

**Results**: Four themes were identified, with 13 categories and 10 subcategories illustrating these themes in greater detail (Table 1). Accounts most frequently referenced difficulties eating solids, the need to modify diets to accommodate masticatory issues, and uncertainty related to intermittent TMJ flares and subsequent eating and swallowing issues. Findings suggest that people with RA commonly experience under-recognized eating and swallowing problems, with discernible, yet apparently overlooked, impact on physical functioning, socialization, and emotional well-being, which may negatively impact clinical outcomes, and exacerbate an already tenuous lived experience with this condition. Future research should
build on this early investigation of other online resources and involve patients themselves in the design of supports to guide individuals to living well with these issues.

**Poster of Merit**: Patient-Reported Swallowing Outcomes in Head and Neck Cancer Patients: Longitudinal Changes and Associations with Clinical Variables

**Session Title**: Eposter Session P: Dysphagia After HNC Treatment

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1University of Toronto; 2University Health Network

**Introduction**: Treatment of head and neck cancer (HNC) often has lasting negative impacts on swallowing. This study compared longitudinal changes in patient-reported swallowing outcomes related to function and emotion and assessed for associations with clinical variables.

**Methods**: A prospective study consecutively recruited patients with HNC from 2014 to 2018. Self-reported swallowing outcomes were measured under two domains: function (mode of intake, range of liquids, solids) and emotion (eating in public), at 6, 12, and 24 months post-treatment. Clinical variables associated with worse outcomes at 6 and 12 months were identified using univariable regression analysis. Longitudinal changes in function and emotion were examined in a subgroup at all time points using repeated-measures ANOVA.

**Results**: Of 589 enrolled patients, mean age (SD) was 61 (Â± 11) years and 76% were male. Function was worse at 6 and 12 months, respectively, in patients with HPV- oropharyngeal cancer (p < 0.001, p < 0.05), and stage III (p < 0.001, p < 0.05) and IV (p < 0.0001) cancer. Patients treated with chemoradiation (CRT) showed worse function at 6 months (p < 0.01). Function improved in surgically treated patients at 6 and 12 months (p < 0.05). At 6 and 12 months, worse emotion was shown in stage III (p < 0.05) and IV (p < 0.001). Patients who received combined CRT/surgery had worse emotion at 6 months (p < 0.05). Emotion was improved at 6 and 12 months for laryngeal cancer patients (p < 0.05). The subgroup of 58 patients who reported on swallowing at all 3 time points had varied treatments but better baseline ECOG scores (p = 0.04). Over time, these patients reported improvements in nutritional mode, range of solids and eating in public (p = 0.05, p = 0.03, p = 0.04, respectively).

**Conclusion**: Although overall patients reported improvements in nutritional mode, range of solids and emotion over 24 months; variables such as cancer site, HPV status, and advanced staging were associated with worse swallowing outcomes.
Dysphagia in Myositis: Results from a Systematic Review and Meta-Analysis

Session Title: Eposter Session P: Dysphagia After HNC Treatment

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Introduction: Dysphagia is a clinical hallmark and part of the current American College of Rheumatology/European League Against Rheumatism (ACR/EULAR) diagnostic criteria for idiopathic inflammatory myopathy (IIM). However, the data on dysphagia in IIM are heterogeneous and partly conflicting. The aim of this study was to conduct a systematic review on epidemiology, pathophysiology, outcome, and therapy and a meta-analysis on prevalence of dysphagia in IIM.

Methods: Medline was systematically searched for all relevant articles. A random effect model was chosen to estimate the pooled prevalence of dysphagia in the overall cohort of patients with IIM and in different subgroups.

Results: 234 studies were included in the review and 116 (10,382 subjects) in the meta-analysis. Dysphagia can occur as initial or sole symptom. The overall pooled prevalence estimate in IIM was 36% and with 56% particularly high in inclusion body myositis. Prevalence estimate was significantly higher in patients with cancer-associated myositis and with NXP2 autoantibodies. Dysphagia is caused by inflammatory involvement of swallowing muscles, which can lead to reduced pharyngeal contractility, criopharyngeal dysfunction, reduced laryngeal elevation, and hypomotility of the esophagus. Swallowing disorders not only impair the quality of life but can lead to serious complications such as aspiration pneumonia, thus increasing mortality. Beneficial treatment approaches reported include immunomodulatory therapy, the treatment of associated malignant diseases or interventional procedures targeting the criopharyngeal muscle such as myotomy, dilatation or botulinum toxin injections. Conclusion: Dysphagia should be included as a therapeutic target, especially in the outlined high-risk groups.

Symptoms of Oropharyngeal Dysphagia, Efficiency and Safety of Deglutition in Patients After Treatment of Head and Neck Cancer

Session Title: Eposter Session P: Dysphagia After HNC Treatment

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Introduction: Individuals undergoing treatment for head and neck cancer may show less awareness and perception of specific dysphagia symptoms (1), making it necessary to distinguish between dysphagia symptoms and objective evidence of swallowing dysfunction to minimize dysphagia and its sequela in this population. Objective: to verify the relationship between symptoms and signs of oropharyngeal dysphagia after treatment of head and neck cancer.

Methods: Retrospective observational cross-sectional analytical study that included 25 adult and elderly patients with head and neck cancer who completed treatment three months or more ago. After approval by the Research Ethics Committee (CAAE 14962319.9.0000.5417), data from the Eating Assessment Tool (EAT-10) protocol (2, 3), which verifies the symptoms of oropharyngeal dysphagia, as well as the swallowing videofluoroscopy exams, were analyzed. From the videofluoroscopy exam, the degree of oropharyngeal dysphagia was classified, as well as the safety and efficiency of swallowing using the DIGEST scale (Dynamic Imaging Grade of Swallowing Toxicity) (4, 5). The data found were submitted to Pearson’s correlation test, adopting a significance level of 5%.

Results: There was a significant correlation between question 4 of EAT-10 (force to swallow food—solids) with the efficiency profile (p = 0.004) and with the DIGEST score (p = 0.002). No significant relationship was found between the DIGEST score and the total EAT-10 score (p = 0.180) and not even between the total EAT-10 score and the efficiency (p = 0.129) or safety (p = 0.878) of the Deglutition.

Conclusion: After long-term treatment of head and neck cancer, the individual’s perception of the swallowing function may not be consistent with the findings of instrumental assessment, demonstrating the importance of assessing the function of swallowing in this population.

European Society for Swallowing Disorders – Confederation of European Otorhinolaryngology Head and Neck Surgery White Paper: Oropharyngeal Dysphagia in Head And Neck Cancer

Session Title: Free Papers 1: Dysphagia in Head and Neck Cancer and Specific Conditions

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Introduction: Given the need for a consensus across Europe for the treatment of oropharyngeal dysphagia (OD) in head and neck cancer (HNC), The European Society for Swallowing Disorders (ESSD) initiated collaboration with relevant European professional medical associations to write a White Paper on this topic. The purpose of this document is to inform health professionals of the various disciplines involved in the management of OD associated with HNC about the state of the art with regard to the different aspects of care.

Materials and Methods: Experts in the management of specific aspects of OD in HNC across Europe were invited to contribute to this document. Evidence is based on systematic reviews, consensus-based position statements, and expert opinion.

Results: Twenty-five sections on HNC-specific OD topics.

Conclusion: This European White Paper summarizes current best practice on management of OD in HNC, providing recommendations to support patients and health professionals. The body of literature and its level of evidence on diagnostics and treatment for OD in HNC remain
Relationship Between Cough Dysfunction and Swallowing Safety in Cerebellar Ataxia

Session Title: Free Papers 1: Dysphagia in Head and Neck Cancer and Specific Conditions

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Introduction: Airway protective deficits are a critical concern in Cerebellar Ataxia (CA), with significant quality of life and health implications, including aspiration pneumonia—a leading cause of death. While swallowing deficits in CA have been described, no studies to date have measured cough function. The aim of this study was to objectively measure cough and swallowing function in CA and identify the relationship between cough parameters and airway invasion during swallowing.

Methods: 30 individuals with CA from a variety of neurogenic etiologies (17 males, 13 females; age 27–69) underwent instrumental evaluations of swallowing, voluntary cough testing, and reflex cough testing. Measures of airway invasion, cough effectiveness, and reflex cough sensitivity were analyzed. Descriptive and correlation analyses were conducted.

Results: 84% of participants demonstrated airway invasion during swallowing and over 50% did not reliably respond to reflex cough-inducing stimuli. Worse swallowing safety was correlated with reduced strength of voluntary cough airflow parameters, including lower peak expiratory flow rate (= -0.584; p = 0.01) and cough volume acceleration (= -0.66, p = 0.001) as well as fewer number of coughs produced during reflex cough testing (= -0.667; p = 0.005). Cough motor outcomes within participants were characterized by marked variability in effectiveness. Discussion: This is the first study to objectively quantify cough deficits in CA and identify a relationship between cough parameters and swallowing safety. Reduced cough effectiveness, variability in cough motor performance, and cough sensory deficits were identified.

Conclusion: Deficits of swallowing and cough are concomitant in individuals with CA. Therefore, cough may be considered as a potential screening tool for swallowing dysfunction and a treatment target in this population.

Outcome and Phenomenology Of Oropharyngeal Dysphagia in Myositis

Session Title: Free Papers 1: Dysphagia in Head and Neck Cancer and Specific Conditions

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Background: Oropharyngeal dysphagia frequently occurs in patients with myositis and is part of the European League Against Rheumatism diagnostic criteria indicating idiopathic inflammatory myopathy (IIM). This study investigated predictors, outcome, and phenomenology of oropharyngeal dysphagia in patients with different types of IIM.

Methods: Flexible endoscopic evaluation of swallowing videos of 71 IIM patients was retrospectively analyzed for salient findings such as bolus spillage, penetration, aspiration, and pharyngeal residue. Based on these findings, dysphagia severity was rated on an ordinal scale: (1) no signs for dysphagia, (2) dysphagia without aspiration, (3) dysphagia with aspiration of one bolus consistency, and (4) aspiration of multiple bolus consistencies. Regression analyses were performed to investigate demographic and disease-specific predictors of dysphagia severity and pneumonia as outcome-relevant complication of dysphagia. A score is proposed to rate the quality of the endoscopic white-out as a surrogate marker for pharyngeal muscle weakness with consecutive residue. Its significance was evaluated by correlation with residue severity.

Results: Our analysis revealed no independent predictors of dysphagia severity in IIM. Dysphagia severity, however, was the only independent predictor for pneumonia, which occurred in 24% of patients. Pharyngeal residue with risk of postdeglutitive aspiration was the most common dysphagia pattern. Attenuation of the endoscopic white-out was related to residue severity.

Conclusion: Dysphagia in IIM is associated with relevant complications such as aspiration pneumonia and must be considered independently of peripheral muscle weakness and disease duration. Swallowing impairment mainly presents with pharyngeal residue. Here, the quality of the white-out may serve as a semi-quantitative surrogate marker for pharyngeal contractility.

Incidence, Risk Factors and Associated Morbidity of Dysphagia in Postoperative Cardiac Surgery Patients

Session Title: Free Papers 1: Dysphagia in Head and Neck Cancer and Specific Conditions

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Introduction: Although dysphagia is a known complication of cardiac surgery; incidence, risk factors and associated outcomes of postoperative dysphagia remain unclear. We therefore sought to determine the incidence of postoperative swallowing impairment in cardiovascular patients and examine associated risk factors and health-related outcomes.

Methods: A prospective single-center study was conducted in postoperative adult cardiovascular patients with no history of dysphagia. A fiberoptic endoscopic evaluation of swallowing was performed < 72 h of extubation. Blinded raters completed validated outcomes of swallowing safety and efficiency. Demographic, surgical, and postoperative health-related outcomes were collected. Univariate and multivariable regression analyses were performed with odds ratios (OR) and 95% confidence intervals (CI).

Results: In 182 patients examined, imaging confirmed inefficient swallowing in 52% of patients and unsafe swallowing in 94% (65% penetrators, 29% aspirators). Silent aspiration was observed in 53% of aspirators and a further 32% did not clear aspirate material. Independent risk factors for aspiration included: NYHA III-IV (OR:2.9, CI:1.5 to 6.7); reoperation (OR:2.0, CI:0.7 to 5.3); transeosophageal echocardiogram images > 110 (OR:2.6, CI:1.1 to 6.3); intubation > 27 h (OR:2.1, CI:0.8 to 5.3); and endotracheal tube size 8.0
Altered Swallow Biomechanics in Moderate-Severe Obstructive Sleep Apnea Syndrome

Session Title: Free Papers 1: Dysphagia in Head and Neck Cancer and Specific Conditions

Introduction: There is increasing recognition of the high prevalence of dysphagia in patients with Obstructive Sleep Apnea Syndrome (OSAS). The contributing mechanisms remain unknown. High-resolution pharyngeal manometry (HRPM), which provides quantifiable evaluation of swallowing biomechanics, has not previously been used in OSAS patients. The aim of this study was to analyze the swallow biomechanics and symptoms in moderate-severe OSAS patients.

Materials and Methods: Eighteen (4 female, mean age 47 y, range 26–68 y) moderate-severe OSAS patients had HRPM testing with 5, 10, and 20 ml volumes of thin (IDDSI 0) and extremely thick (IDDSI 5) liquids.

Results: Compared to non-aspirators, aspirators waited an additional 85-h to resume oral intake, incurred $49,372 increased costs, and experienced a 43% longer hospital stay, p < 0.05. Aspiration was associated with pneumonia (OR:2.6, CI:1.1 to 6.5); reintubation, (OR:5.7, CI:2.1 to 14.0), and death (OR:2.8, CI:1.2 to 9.0).

Conclusions: Tracheal aspiration was prevalent, covert, and associated with increased morbidity and mortality.

Fig. 1 Comparison of pharyngeal swallow function metrics between healthy participants and OSAS patients using HRPM metrics.
Prevalence and Predictors of Neurogenic Dysphagia Following Mechanical Endovascular Therapy in Ischemic Stroke

Session Title: Free Papers 2: Neurology and ICU
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Introduction: Endovascular stent-retriever-based treatment (EST) of ischemic stroke due to large vessel occlusion (LVO) is a relatively new therapeutic method which has led to a significant reduction of mortality and disability. Although high prevalence rates are expected due to factors related to both stroke itself (occlusion of critical vessels) and treatment (endotracheal intubation as part of the procedure), there are no data yet on prevalence and severity of neurogenic oropharyngeal dysphagia (NOD) following EST in LVO.

Materials and Methods: We analyzed the data from a monocentric database including EST in LVO patients of 2016 and 2017. Presence of dysphagia (yes/no) was assessed by evaluating results from clinical and apporative examination such as Fiberoptic Evaluation of Swallowing (FEES), and from Functional Oral Intake Scale values. In uni- and multivariate analyses, prevalence and predictors of NOD were calculated.

Results: 301 (51.5% male, age 74.0 y [12.9] patients received EST, 52.8% of which also received intravenous thrombolysis. Mean National Institute of Health Stroke Severity (NIHSS) Scores on admission were 15.8 [6.99]. According to Hospital Frailty Risk Scores (HFRS), 28.9% of patients were frail. Vascular comorbidities were frequent. After EST, 40.3% of patients could be extubated immediately. Prevalence of NOD was 74.8%. In 19.5%, silent aspiration occurred while in 26.7% of cases, nil by mouth (npo) was prescribed. Predictors for NOD were stroke severity (NIHSS, OR = 1.1, 95%CI 1.07–1.18, p < 0.001), frailty (OR 3.5, 95% CI 1.16–7.97, p = 0.003) and serum glucose levels (mg/dl, OR = 1.01, 95% CI 1.003–1.02, p = 0.009). Immediate extubation was negatively associated with NOD (OR = 0.46, 95% CI 0.25–0.85, p = 0.013).

Conclusion: Prevalence and severity of NOD are high after EST. We identified potentially modifiable periprocedural risk factors. Still, intensive dysphagia management is mandatory in this cohort lest therapeutic successes of EST are squandered.

Prevalence of Oropharyngeal Dysphagia and Malnutrition in Patients with Covid-19 at a General Hospital During Spring 2020 Pandemics

Session Title: Free Papers 2: Neurology and ICU
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Rationale: COVID-19 may manifest with a wide range of symptoms and its degree of severity may be from mild to very severe. Prevalence and mechanisms for oropharyngeal dysphagia (OD) and malnutrition (MN) in COVID-19 patients is unknown. Our aim was to assess the prevalence and pathophysiology of OD, MN; nutritional risk, and the needs of compensatory treatments in patients admitted due to COVID-19 to a general hospital during 2020 spring pandemics.

Methods: Prospective observational study with clinical assessment of OD (clinical symptoms, clinical observation and Volume-Viscosity Swallowing Test) and nutritional screening and assessment with NRS2002 and GLIM criteria in consecutive COVID-19 patients admitted to a hospital. Patient’s clinical characteristics and their needs of compensatory treatments for OD and MN were assessed at hospital admission and discharge. Results: We included 268 hospitalized patients, 52.2% men, with a mean age of 70.2 ± 17.0 years. At hospital admission, prevalence of OD was 53.1% (49.4% had impaired efficacy and 44.9% impaired safety of swallow). 27.9% of patients were newly diagnosed of OD on admission. Pathophysiology of OD included ICU (13.4%), neurological factors (35.8%), and pneumonia (61.9%). Up to 43.7% of patients needed thickeners to be safely hydrated (38.7% with 250 mPa·s and 5.2% with 800 mPa·s of xanthan gum) and 54.5% had mastication impairments needing texture-modified diets. Up to 73% patients presented nutritional risk at admission (NRS2002 > 3), and 37.7% developed MN according to GLIM during hospitalization with a mean weight loss of 9.35 ± 6.03 kg. Mortality rate was 9.32%, all of them with OD and MN.

Conclusions: Prevalence of OD, nutritional risk, and MN in patients with COVID-19 on admission to a General Hospital is very high. Pathophysiology is multifactorial and not limited to ICU factors. Early treatment includes fluid thickening, texture-modified foods and nutritional supplements.
Non-oral Feeding in Neurodegeneration. A Qualitative Meta-Synthesis of Evidence

Session Title: Free Papers 2: Neurology and ICU
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Introduction: Non-oral feeding (NOF) is recommended to provide nutrition and hydration that is no longer safe or possible to receive orally. It is not well understood how people diagnosed with a neurodegenerative disease experience NOF. We aimed to review and synthesize the evidence published on this topic to inform clinical practice and identify research gaps.

Methods: A systematic review and meta-ethnographic synthesis of qualitative studies was conducted. Eight databases were systematically searched from inception to May 2020. Inclusion criteria: Studies reporting experiences of adults with a neurodegenerative disease (Amyotrophic Lateral Sclerosis, Dementia, Huntington Disease, Multiple System Atrophy, Progressive Supernuclear Palsy, Multiple Sclerosis, Parkinson’s Disease), who currently have a feeding tube in situ or are making decision regarding NOF. Exclusion criteria were as follows: quantitative studies; studies reporting experiences of adults with a non-neurodegenerative disease or people <18 years old; and studies where the focus is on the family caregiver or health professional experiences.

Results: Of 2573 unique records identified, only eight fulfilled the review criteria. All of them recruited participants with Amyotrophic Lateral Sclerosis and there was no representation from other neurodegenerative diseases. Decision making emerged as the most complex and predominant theme. In comparison, the everyday experiences of living with NOF were not investigated in depth. A “line of argument” illustrating how people decide for/against NOF was developed. The subjectively perceived swallowing ability was an important factor influencing decision making, unlike the objective severity of dysphagia.

Conclusion: The evidence regarding the lived experience of NOF for people with a neurodegenerative disease is lacking. There is a need to conduct more mixed-methods studies on this topic in order to inform clinical practice and provide appropriate supports.

Perspectives on the Role of Speech and Language Therapists Working in International Critical Care Settings: An International Survey

Session Title: Free Papers 2: Neurology and ICU
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Introduction: Speech-language therapists (SLT) are gaining increasing recognition worldwide as an integral member of the critical care (CC) multidisciplinary team (MDT) (1–4). However, apart from the UK, there is a lack of Speech and Language Therapy CC-specific guidelines. This study aimed to explore and compare clinical practice in the management of dysphagia, communication and tracheostomy among SLTs working in adult CC units internationally.

Methods: An online 66 item survey was distributed via SLT networks and social media from Nov 2019–Jan 2020. Participants were SLTs with clinical experience in dysphagia working in CC internationally within the last 3 years.

Results: 366 responses were largely from academic teaching (30.7%, 155/505), public (27.9%, 141/505) and regional (22.8%, 115/505) hospitals. The total CC SLT whole-time equivalent (WTE) at each grade was lower (mean difference: −0.21 to −0.65 WTE p < 0.001) than what was reportedly needed to provide an optimal service. Negative effects of under-staffing were reported (Fig. 1). UK guidance (1) that all tracheostomized patients receive speech and language therapy was unmet in 66% (220/334) of services. 22% (73/331) of SLTs reported use of screening tools for dysphagia in tracheostomized patients, 39% (129/331) for dysphagia post-extubation and 13% (37/287) for communication in all CC patients. NICE guidelines (4) of 45 min of daily therapy were always met in 9% (31/350) of services. Many respondents rated their service provision as “good” or “very good” for dysphagia (66%, 231/352), tracheostomy (50%, 174/351) and communication (40%, 141/351). The need for further specialized training and resources was reported.

Fig. 1 Negative effects of understaffing in the care of dysphagia: risks for the patient and families

Risks of Reduced Staffing for Patients and Families

- Reduced communication/dysphagia therapy time
- Reduced training/education with families
- Patient having difficulty communicating
- Negative impact on patient’s quality of life
- Delayed commencement of oral intake
- Delay in initial assessment
- Other professional taking on SLT role
- Increased patient length of stay
- Delayed tracheostomy weaning/increased days with...
- Increased duration of time requiring artificial feeding
- Difficulty for patients to participate in care and treatment
- Increased frequency of aspiration/aspiration pneumonia
- Cannot access best evidence based therapy option due to...
- Other

Frequency (%)
Conclusion: Findings provide evidence that SLT input in CC is limited in terms of dedicated posts, MDT involvement, consistent management approaches, and training opportunities. This is significant in this COVID-19 era. We provide preliminary evidence and direction for further development.

Post Extubation Dysphagia: Development and Implementation of an Evidence-Based Screening Algorithm

Session Title: Free Papers 2: Neurology and ICU
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Introduction: Dysphagia is common after prolonged endotracheal intubation. A prevalence of 67.5% in patients intubated for greater than 48 h post-cardiovascular surgery has been reported, with patients twice as likely to develop dysphagia for every additional 12 h period of intubation. Best practice guidelines for screening and referral to speech-language pathology (SLP) for post-extubation dysphagia (PED) assessment do not exist. The purpose of this review was to develop and implement an evidence-based screening algorithm for PED to guide appropriate referrals for assessment.

Methods: A Medline database literature review was conducted on April 17, 2017 (all published articles before April 2017). Search terms included: airway extubation, extubation, deglutition disorders, and dysphagia. Articles were limited to English language, humans and adults. Further articles were sourced through manual searching of relevant journals and bibliographies and consultation with colleagues. Twenty-seven articles were reviewed by an interdisciplinary working group from four intensive care units. Based on group consensus, risk factors from 20 of these articles were included in the Swallowing Algorithm Post-Exubtation (SAPE).

Results: SAPE was developed and implemented across four critical care units. Surveys of critical care nursing staff revealed that post-SAPE implementation, 74% identified prolonged intubation as a risk factor for PED, 64% were confident knowing when to start PO intake and 84% consulted SLP post-extubation. Referrals to SLP increased by 40%.

Conclusion: SAPE was developed based on best evidence to identify patients at risk of dysphagia and implemented across four critical care units, resulting in an increased number of referrals to SLP and earlier access to swallow rehabilitation. Research is required to evaluate sensitivity and specificity and to determine efficacy with respect to referring appropriate patients for assessment.

Construct Validity and Inter-Rater Reliability of an ICU-Scale for SLTs

Session Title: Free Papers 2: Neurology and ICU
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Introduction: To scale and monitor the status of tracheotomized patients on an intensive care units (ICU) by speech-language therapists (SLTs), a one-page assessment was developed with nine items rated on six-point descriptive scales: physical condition, (in)dependent breathing, coughing, cuff status, oral intake, swallowing, voice quality, intelligibility, and cognitive status. After years of clinical use and adaptations, the scale was finalized and considered face valid. The aim of this study was to examine its construct validity and the inter-rater reliability in tracheostomized patients on ICU.

Material and Methods: For construct validity, scales completed by experienced SLTs in two hospitals were prospectively collected and analyzed by conducting an exploratory factor analysis, calculating internal consistency and floor or ceiling effects. The scales were randomly selected from records in the early, intermediate, or later stage of treatment to investigate known groups validity. For inter-rater reliability, two SLTs independently scored the scale at the time point for 12 patients and intraclass correlation coefficient (ICC) was calculated.

Results: 41 tracheotomized ICU patients were included with a mean age of 60 years. Factor analysis identified three subdomains: (A) physical and cognitive condition; (B) breathing, coughing and cuff status; (C) swallowing, voice and speech. Internal consistency was 0.87 for the total scale, 0.69, 0.79 and 0.88 for subscale A, B and C. There were no floor or ceiling effects. The scale differentiated significantly (p < 0.001) between the severity groups. Inter-rater reliability was excellent, with an ICC for the total scale of 0.97 (95% CI: 0.90–0.99), and ranging between 0.93 and 0.95 for the subscales.

Conclusion: This ICU-scale for SLTs is a valid and reliable clinical tool to describe and evaluate the status of tracheostomized patients. Further research to assess validity against other scales is justified.

The Effect of Carbonation on Dysphagia for Liquids and Predictors for Good Response to Carbonation—A Prospective Study Using Fiberoptic Endoscopic Evaluation of Swallowing

Session Title: Free Papers 3: Screening, Assessment and Management of Dysphagia
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Introduction: Carbonation as a sensory enhancement strategy for prevention of aspiration of thin liquids has not been thoroughly studied. The aim of our study was to examine the effect of carbonation on penetration-aspiration and pharyngeal residue in dysphagia patients using Fiberoptic Endoscopic Evaluation of Swallowing (FEES) and to identify parameters associated with a response to carbonation.

Methods: A prospective study of patients undergoing FEES in a dysphagia clinic. Patients were offered 100 cc of dyed water. Penetration-aspiration was scored using the penetration-aspiration scale (PAS). Residue was scored using the Yale Pharyngeal Residue Severity Rating Scale (YPR-SRS). Patients with a PAS of 2 or higher for water were subsequently offered 100 cc of carbonated water. PAS, YPR-SRS, and residue clearance were compared between thin and carbonated liquids. Multivariate logistic regression analysis was used to identify the predictors for good response to carbonation.

Results: 84 patients were enrolled, 77.4% males, with diverse dysphagia etiologies (58.3% neurogenic, 11.9% radiation induced, 23.8% deconditioning induced, and 6% neck surgery induced). Median PAS was 7 (IQR 4–8) for thin liquids and 4.5 (IQR 2–8) for carbonated liquids (P = 0.0001). YPR-SRS was reduced for carbonated compared to thin liquids in the vallecula (1.5 ± 0.83 vs 1.76 ± 0.93, P = 0.001) and piriform sinuses (1.5 ± 0.87 vs 1.67 ± 0.9, P = 0.0002). 31 patients had improvement in PAS with carbonation. Age and deconditioning as a dysphagia etiology were found to predict good response to carbonation on multivariate logistic regression analysis.
Conclusion: Carbonation is an efficient strategy for aspiration prevention and residue management for some patients with dysphagia for liquids.

Objective Quantitative Swallow Measures of Children: A Video-Fluoroscopic Study

Session Title: Free Papers 3: Screening, Assessment and Management of Dysphagia

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Videofluoroscopy (VFSS) visualizes the dynamic mechanism of swallowing and is considered the gold standard assessment of swallowing in children. Lack of objective quantitative data on swallowing biomechanics leads to subjective interpretation and reporting, resulting in low reliability. Objective interpretation with improved reliability may assist meaningful comparisons. This retrospective observational study aimed to predict likelihood of aspiration through objective and quantitative VFSS measures in children. We selected VFSS data of 533 children (0–21 years) from a pediatric hospital database for evaluation. A standard protocol of VFSS administration was used and data were recorded at 30 frames per second. A standardized set of quantitative and descriptive swallow measures were obtained for each child using a specialized software. Satisfactory inter-rater and intra-rater reliability were achieved for all the measures. Binomial logistic regression with backward likelihood ratio, controlled for age, gender, and etiology, was used to obtain risk ratios (RR), from which cutoff marks were derived. We found bolus clearance ratio (BCR), pharyngeal constriction ratio (PCR), duration to hyoid maximal elevation (Hdur) and total pharyngeal transit time (TPT) to be predictive of aspiration. Risk of aspiration was increased by 100% or more, when BCR = 0.1 (RR = 19.58, CI = 1.31–292.12, \( p = 0.03 \)), TPT = 2 s (RR = 14.77, CI = 1.98–110.18, \( p = 0.009 \)), Hdur = > 1 s (RR = 13.51, CI = 1.79–102.12, \( p = 0.012 \)) and PCR = 0.2 (RR = 7.64, CI = 1.05–55.35, \( p = 0.04 \)). These thresholds provide predictive measures of aspiration likelihood and are clinically useful in identifying swallow risk in children, even if no aspiration is observed during VFSS. Measuring objective parameters will improve VFSS credibility and reliability, increase comparability across research groups, identify changes over time in individuals, and optimize value of these studies in young patients at greater risk from ionizing radiation.

Validity Of The Child Feeding Questionnaire for The Prediction of Aspiration Risk in Children with Cerebral Palsy

Session Title: Free Papers 3: Screening, Assessment and Management of Dysphagia

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Introduction: This study is a part of a project aimed to develop and validate a clinical assessment tool for SLPs to evaluate the aspiration risk (AR) in children with cerebral palsy (CP). The Child Feeding Questionnaire (CFQ) is based on a questionnaire developed by Benter et al. (2015). The study objective is to evaluate the validity of the parent-administered CFQ.

Materials and Methods: We included 65 parents of children with CP (24–83 months old) in this pragmatic study. They completed the CFQ the PEDI-EAT-10 prior to feeding assessments conducted at home or in the child’s rehabilitation center. After feeding, we evaluated the child on the Classification Systems (levels I-V) of the Eating and Drinking Ability Classification System (EDACS) and Gross Motor Function Classification System (GMFCS-ER). Analyses of the CFQ to identify AR were based on the following clinical criteria standards: PEDI-EAT-10 score with a cutoff score of > 4 to identify AR as established by Serel Arslan et al. (2018) using Videofluoroscopy, and an EDACS cutoff level of > II as defined by Bell et al., 2019.

Results: Raw scores of the CFQ significantly correlated with the PEDI-EAT-10 (rs = 0.52), the EDACS (rs = −0.76) and GMFCS-ER (rs = −0.38) (\( p < 0.01 \)). Children with lower EDACS levels (IV, n = 23, and V, n = 1) had significantly lower CFQ scores than children from each of the higher levels (\( p < 0.05 \)). Moreover, the score of the CFQ was significantly lower in the children at the GMFCS-ER level V than in children at level II (\( p < 0.05 \)). CFQ and PEDI-EAT-10 z-scores did not differ (\( p = 0.93 \)). ROC analysis was used to estimate optimal CFQ cutoff scores to identify children with AR. A CFQ score < 47 (sensitivity = 75%; specificity = 88%; +LR = 6.25; -LR = 0.28) relates to EDACS level > II. A CFQ score < 55 (sensitivity = 78.6%; specificity = 77.8%; +LR = 3.54; -LR = 0.28) relates to a PEDI-EAT-10 score > 4.

Conclusion: The CFQ is a valid clinical tool to detect the AR in children with CP with good concurrent and divergent validity.

Pharyngeal Bolus Propulsion: Relationships Between Pharyngeal Pressures, Contraction, and Residue

Session Title: Free Papers 3: Screening, Assessment and Management of Dysphagia

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Introduction: Bolus propulsion through the pharynx is crucial for efficient swallowing. The relationships between pharyngeal pressures, pharyngeal contraction, and residue are not fully resolved. We aimed to examine how pharyngeal pressures relate to biomechanics and what influences pharyngeal residue in a heterogeneous group of healthy individuals and persons with dysphagia.

Materials and Methods: We assessed pharyngeal high-resolution manometry (HRM) and videofluoroscopy (VF) data for 10 ml liquid swallows (IDDSI 0) from normative (n = 77) and patient (n = 77) databases where HRM/VF were performed simultaneously or up to 60 days apart. We calculated pharyngeal contractile integral (PbCI) and maximum pressures from the velopharynx, tongue base, and hypopharynx regions. We evaluated VF using the Modified Barium Swallow Impairment Profile (MBSImP), Pharyngeal Constriction Ratio (PCR), and Normalized Residue Ratio Scale (NRRS). We performed linear regressions to evaluate relationships between HRM metrics and VF biomechanics as well as relationships between the NRRS and HRM + VF metrics. We also used logistic regression to examine which metrics best differentiated persons with dysphagia from controls.

Results: PbCI, velopharynx, and tongue base maximum pressure are best described by MBSImP tongue base retraction scores (\( p = 0.02; p = 0.003; p = 0.002 \), respectively), whereas hypopharynx maximum pressure is best described by PCR (\( p = 0.016 \)). Vallecular residue is best described by PCR and MBSImP tongue base retraction (\( p < 0.001 \)), and pyriform sinus residue is best described by PCR and hypopharynx maximum pressure (\( p < 0.001 \)). The metrics that best differentiate persons with dysphagia from controls are PbCI and PCR (\( p < 0.001 \)).
Discussion: Pharyngeal bolus propulsion is multifactorial and dependent on pharyngeal pressure generation and biomechanics. Pairing pharyngeal HRM with VF may provide additional information that explains pharyngeal bolus propulsion better than each alone.

A Systematic and Universal Artificial Intelligence Method for Oropharyngeal Dysphagia (OD) Screening: How to Increase Diagnosis of OD Using Risk Management

Session Title: Free Papers 3: Screening, Assessment and Management of Dysphagia

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Introduction: Diagnosis of OD requires a three-step approach consisting of clinical screening and clinical and instrumental assessment. Patients who have “failed” the screening test are at risk of OD and need further clinical and/or instrumental assessment. Machine learning (ML) and the digitalization of medical records enable the development of risk management algorithms for systematic screening of OD. The aim of this study is to develop an expert system (ES) based on ML that calculates the risk of OD from the clinical history of all hospitalized older patients during admission.

Methodology: Our database has data from 5,159 hospitalized older patients (mean age 84.46 ± 6.42, mean Barthel 46.27 ± 31.09) with a 60.90% prevalence of OD according to the Volume-Viscosity Swallowing Test. We studied the prediction power of 17,732 variables using their ICD codes and linear regression and random forest to develop the ES. The ES predicts OD risk with high accuracy in older patients admitted to acute hospitals. It provides a systematic and universal artificial intelligence system for OD screening in real time during admission, allowing the most appropriate diagnostic and therapeutic strategies to be selected for each patient. More OD patients are detected with fewer resources.

Results: The resulting system offers a sensitivity of 0.90–0.75, a specificity of 0.6–0.36, PPV = 0.71–0.63, and NPV = 0.75–0.67 with a ROC AUC = 0.769 to detect OD patients. It uses 129 variables, key ones being related to frailty, low functional capacity, and cognitive impairment. Results of risk estimation for OD are provided in real time on nurses’ and physicians’ workstation screens.

Conclusions: The ES predicts OD risk with high accuracy in older patients admitted to acute hospitals. It provides a systematic and universal system for OD screening in real time during admission, allowing the most appropriate diagnostic and therapeutic strategies to be selected for each patient. More OD patients are detected with fewer resources. Ideally, this will lead to a reduction in the main complications of OD (malnutrition, dehydration, aspiration pneumonia, mortality) and an improvement in the quality of life of dysphagic patients.

Making a Meal of It—The Feasibility and Acceptability of Using Finger Foods in Hospital

Session Title: Free Papers 3: Screening, Assessment and Management of Dysphagia

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Introduction: People who have had a stroke are at high risk of eating difficulties, leading to reduced food intake especially while in hospital. Finger foods (foods eaten without cutlery) may support people after stroke to increase feeding independence, dietary intake, dignity, and control over mealtimes. At present, the effect of offering finger foods in hospital has not been formally evaluated. This study aimed to determine the feasibility, acceptability, and cost of using a finger food menu on an acute stroke ward, to inform important parameters for a future randomized controlled trial.

Materials and Methods: A mixed-methods feasibility study was conducted using a pre–post study design. Primary feasibility measures including patient recruitment and retention over 3 lunchtime observations were recorded. Dietary intake was assessed via visual estimates from digital photos. Qualitative semi structured interviews with patients and staff were conducted to understand the acceptability of the intervention.

Results: Full data over three lunchtime meals were collected for 19 of 31 participants with attrition mainly attributed to patients moving from the ward. Qualitative data highlighted important implications for implementing a finger food menu on a wider scale. Patients described finger foods as important to support eating independently. Staff acknowledged need for ongoing assistance, despite increased patient feeding independence. Staff were aware of safety such as hand hygiene and options for finger foods for patients on modified diets.

Conclusion: Overall, finger foods provided a more energy dense option for patients compared to the standard menu offered and were generally well accepted. There is a challenging balance between patient independence, staff time, and support offered to patients. A future clinical trial to evaluate the effectiveness of the intervention in a multi-site study will need to consider the system in which it is being implemented.

Effect of Capsaicinoids on Neurophysiological, Biochemical, and Mechanical Parameters of Swallowing Function

Session Title: Free Papers 4: Stimulation Techniques

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Introduction: Oropharyngeal dysphagia (OD) is a prevalent condition with aging presenting with impaired efficacy and safety of swallowing due to a loss of muscle force and sensory deficits. Stimulating the oropharynx with capsaicin that mediates Substance P (SP) release is an emerging pharmacological treatment. In the present study, we evaluated its effect on biochemical, neurophysiological and biomechanical parameters of swallowing function.

Material and Methods: In a randomized study on healthy individuals, the impact of orally administered capsaicinoids at different dosages and application durations in comparison with non-carbonated water was evaluated. Time course and magnitude of salivary SP increase were monitored. Magnetoencephalography (MEG) was used to detect cortical swallowing network alterations. Modifications in swallowing biomechanics were measured applying high-resolution pharyngeal manometry (HRPM).

Results: Capsaicinoids at 10 M improved swallowing efficacy as seen by a significant increase of pharyngeal contractile integral and upper esophageal sphincter activation and relaxation times in HRPM. In the MEG significant improvement of precision in a challenging swallow task accomplished by a reduction in swallowing-related submental EMG power was observed with capsaicinoids.
Preconditioning at 10 M over 5 min, but not with continuous stimulation. The cortical activation pattern remained unchanged after any intervention. A significant increase of salivary SP was not detected with 10 M but with 50 M and lasted for 15 min after application. Conclusion: Capsaicinoids mediate dose-dependent SP release and positively alter swallowing biomechanics in healthy subjects. The results provide supportive evidence for the value of natural capsaicinoids as alimentary pharmaceutical to treat OD.

Preconditioned Repetitive Transcranial Magnetic Stimulation On Human Pharyngeal Motor Cortex Enhances Swallowing Behavioral Responses Following Brain

Session Title: Free Papers 4: Stimulation Techniques Stimulation
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Introduction: Despite growing evidence that repetitive transcranial magnetic stimulation (rTMS) can be used as a treatment for dysphagia, its efficacy varies across individuals. Such variability may relate to the neuronal activation before brain stimulation. Our previous findings have shown that preconditioning the pharyngeal motor cortex before rTMS could enhance stimulation effects on cortical excitability through homeostatic mechanisms which regulate brain plasticity (metaplasticity). Here, we further investigated the effects of preconditioned rTMS on swallowing behavior.

Materials and Methods: Fourteen healthy adults (mean age = 289 years; 8 males, 6 females) were recruited. Each participant received 2 (previously determined) preconditioned rTMS protocols (5 Hz preconditioned with 1 Hz rTMS with 30 min inter-rTMS interval and 1 Hz preconditioned with 5 Hz rTMS with 90 min inter-rTMS interval) and the 2 corresponding sham-preconditioned protocols in randomized order on separate days. Their swallowing performance was assessed by a validated reaction time task using pharyngeal pressure events at baseline and every 15 min for an hour after rTMS.

Results: We found that swallowing accuracy was improved after preconditioned 5 Hz rTMS (*p < 0.05; **p < 0.01; s-1–0-5: sham-preconditioned 5 Hz rTMS; 1–30-5: preconditioned 5 Hz rTMS with 30 min inter-rTMS interval)

Fig. 1 Changes in swallowing accuracy after preconditioned 5 Hz rTMS. *p < 0.05; **p < 0.01; s-1–0-5: sham-preconditioned 5 Hz rTMS; 1–30-5: preconditioned 5 Hz rTMS with 30 min inter-rTMS interval

Fig. 1 Changes in swallowing accuracy after preconditioned 1 Hz rTMS. *p < 0.05; **p < 0.01; s-5–0-1: sham-preconditioned 1 Hz rTMS; 5–90-1: preconditioned 1 Hz rTMS with 90 min inter-rTMS interval

Abstract
Abstract

$p = 0.009$, Fig. 2) compared to sham. The effects were significant across all time points after rTMS. Conclusions: Two optimal protocols for inducing functional metaplasticity in human pharyngeal motor cortex have been identified and they appear functionally superior to conventional rTMS. The pre-conditioned rTMS protocols may be relevant to future clinical application in neurogenic dysphagia.

Removal of the Effects of a Virtual Pharyngeal Lesion on Cortical Activation During Swallowing and Pneumatic Stimulation by Pharyngeal Electrical but not Transcranial Direct Current Stimulation

Session Title: Free Papers 4: Stimulation Techniques

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Introduction: Swallowing disorders can be a consequence of pharyngeal hypesthesia in various neurological diseases for which conventional therapeutic options are limited. Recently, innovative neuromodulation devices have shown potential to improve swallowing rehabilitation, the optimal target, however, i.e., central or peripheral, is still not clear.

Materials and Methods: We investigated the effects of pharyngeal electrical stimulation (PES) as a peripheral and transcranial direct current stimulation (tDCS) as a central neuromodulation device to revert the effects of experimentally induced pharyngolaryngeal hypesthesia, either on central processing of pharyngeal sensory stimulation as well as the swallowing motor program in healthy subjects using a sham-controlled design. Changes of cortical activation were detected during pharyngeal air-puff stimulation as well as swallowing water applying magnetoencephalography before and after each intervention.

Results: Only after real but not sham PES, a significant increase of activation compared to the baseline measurement was found in a broad predominantly right-hemispheric network including primary and secondary sensorimotor, pre(frontal) areas and the supramarginal gyrus in the alpha and low gamma frequency range peaking in the premotor area (BA 6) (p < 0.05) during swallowing. Following real PES, a significant increase of activation resulting from pneumatic stimulation was observed in low and high gamma ranges in similar regions, but mainly in the left hemisphere peaking in the premotor area (BA6) and the prefrontal cortex (BA9) (p < 0.05). Significant changes of brain activation after real or sham tDCS compared to baseline were detected neither for the swallowing nor the air-puff stimulation condition.

Conclusion: PES was able to partly remove the effects of reduced sensory input on central processing, whereas tDCS did not show significant effects. These results may have implications on therapeutic decisions in future.

Enhancing Human Pharyngeal Cortical Excitability Through the Application Of Gamma TACS and Full-Spectrum TRNS: A Dose Ranging Exploratory Study

Session Title: Free Papers 4: Stimulation Techniques

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Introduction: Transcranial alternating current stimulation (tACS) and transcranial random noise stimulation (tRNS) have been shown to have physiological and functional effects on brain excitability and motor behavior. Yet, little is known about its effects in the swallowing system. We examined the dose effects of tACS and tRNS to determine the optimal stimulation parameters for modulating excitability of human pharyngeal motor cortex.

Materials and Methods: 10 Hz (alpha), 20 Hz (beta), 70 Hz (gamma) tACS, full-spectrum tRNS and sham were applied over pharyngeal motor cortices at 1.5 mA current intensity for 10 min in 15 healthy participants. Pharyngeal and thenar motor evoked potentials (PMEPs and TMEPs) were assessed before and up to 2 h after stimulation with single pulse transcranial magnetic stimulation.

Fig. 1 Effects of tACS and tRNS on cortico-pharyngeal excitability in the stimulated hemisphere. 70Hz TACS and tRNS increased PMEP compared to sham (p = 0.005, p = 0.027, respectively) which was sustained for 60 min.
Averaged MEP amplitude and latency changes were analyzed using repeated-measures ANOVA (rmANOVA).

**Results:** Two-way rmANOVA across all active interventions demonstrated a significant MEP interaction both in the stimulated pharyngeal cortex (F (4, 56) = 1.731, p = 0.038) and ipsilateral thenar cortex (F (4, 56) = 1.506, p = 0.048). Compared to sham, subsequent post hoc tests showed site-specific and sustained (60–120 min) increases in PMEPs with gamma tACS and tRNS (p = 0.005, p = 0.027, respectively) and for TMEPs with beta tACS (p = 0.006) (Figs. 1, 2).

**Conclusions:** Our findings suggest that the effects of tACS and tRNS are frequency dependent and cortical (representation) site-specific with both gamma tACS and full-spectrum tRNS enhancing human pharyngeal cortical excitability.

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**An Examination into the Effect of Genetic Taste Type and Intensity of Carbonation on Swallowing and Palatability in a Healthy Young Adult Population**

**Session Title:** Free Papers 4: Stimulation Techniques

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**Introduction:** Carbonated liquids have shown promise as a compensatory strategy for the management of dysphagia. This study aims to examine the effect of genetic taste status and intensity of carbonation on swallowing and palatability in a healthy young adult population. The palatability of carbonated liquids over time was also examined.

**Materials and Methods:** 35 healthy young adults were recruited for this prospective cohort study. Participants drank 150 ml of still water (SW), lightly carbonated water (LCW), and highly carbonated water (HCW) in a randomized order. Swallow function, palatability and genetic taste status were assessed using the timed water swallow test, the hedonic general labeled magnitude scale and propylthiouracil strips, respectively.

**Results:** A statistically significant mean difference in palatability ratings was found across intensity levels of carbonated fluids (p = 0.002), specifically between SW (M = 13.57) and HCW (M = -14) (p = 0.001). The palatability of carbonated liquids did not decrease after a 24 h period (n = 5) (p = 0.102). A significant difference was found between SW and HCW on three tests of swallow function: mean time per swallow (p = 0.03), mean swallow velocity (p = 0.001) and mean volume per swallow (p = 0.017). HCW had a greater impact on swallow function than LCW. A significant difference was found between supertasters’ (M = 13.33) and nontasters’ (M = -24.5) palatability ratings of HCW (p = 0.03).

**Conclusion:** Highly carbonated liquids can alter swallow function in a healthy young adult population. HCW is less palatable than SW, but the palatability of carbonated liquids does not decrease over time. Additionally, supertasters find HCW more palatable than nontasters. Carbonated liquids may be suitable for clients with dysphagia; however, further research in a clinical population with instrumental assessment is needed.

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**Pharyngeal Electrical Stimulation for Neurogenic Dysphagia: Main Results from the Pharyngeal Electrical Stimulation for Treatment of Neurogenic Dysphagia European Registry (PHADER) Cohort Study**

**Session Title:** Free Papers 4: Stimulation Techniques

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**Introduction:** Neurogenic dysphagia is common and has conclusively evidence treatment. We assessed whether pharyngeal electrical stimulation (PES [1]) is associated with reduced dysphagia.

**Methods:** PHADER was a prospective single-arm observational cohort study conducted according to the Declaration of Helsinki and approved by Research Ethics. Consenting participants comprised five groups—stroke not needing ventilation; stroke needing ventilation; ventilation required; traumatic brain injury; other neurological causes). PES was administered once daily for three days. The primary
Relationship Between Dysphagia Severity And Deep Cervical Flexor Muscle Activation And Endurance In Patients with Neurogenic Dysphagia

**Session Title:** Free Papers 5: Dysphagia-Treatment: From Brain to Esophagus

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**Introduction:** Deep cervical flexors (DCF) are responsible for cervical stabilization and posture. Proper posture and stabilization play an important role in swallowing function. The aim of this preliminary study was to investigate the relationship between dysphagia severity and DCF muscle activation and endurance in patients with neurogenic dysphagia.

**Materials and Methods:** 18 adults with neurological disorders who underwent modified barium swallowing study were included. The Penetration–Aspiration Scale (PAS) was used to determine penetration–aspiration severity. Cranio cervical flexion test and DCF endurance test were performed.

**Results:** The mean age was 53.16 ± 10.63 years. A significant correlation was found between PAS scores and DCF activation score and endurance (r = -0.51, p = 0.053; p < 0.05, respectively). The patients were divided into patients with aspiration (n = 7) and without aspiration (n = 11). Patients without aspiration had more DCF activation and endurance than patients with aspiration (p < 0.05). The mean DCF activation was 2.28 ± 2.42 mmHg (min = 0, max = 6) in patients with aspiration, and 5.09 ± 2.58 mmHg (min = 0, max = 8) in patients without aspiration. The mean DCF endurance was 14.74 ± 14.72 s (min = 0, max = 41) in patients with aspiration, and 42.45 ± 29.60 s (min = 0, max = 94) in patients without aspiration.

**Discussion:** Exercises focus on suprahyoid muscles are important to provide airway protection in dysphagia rehabilitation. DCF could be important for optimal activation of the suprahyoid muscles, appropriate posture, and stabilization. However, their role in dysphagia rehabilitation has not been investigated. The preliminary study results revealed that neurogenic patients with aspiration had lower DCF activation levels and DCF endurance compared to neurogenic patients without aspiration. Therefore, DCF activation and endurance could be considered while planning dysphagia rehabilitation according to our study results.

**Effects Of The Head Lift And The Recline Exercises On The Neuromuscular Control Of Swallowing: An Electromyography Study In Older Adults**

**Session Title:** Free Papers 5: Dysphagia-Treatment: From Brain to Esophagus

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**Introduction:** Exercises such as the Head Lift (HLE) (Shaker) and the newer Recline (RE) are often used to strengthen the suprahyoid muscles and improve hyolaryngeal excursion and airway safety. The HLE and RE were recently shown to elicit similar biomechanical gains in older adults. However, whether and how the underlying neuromuscular control of swallowing changes after these regimens are not known and could provide insights on the physiological mechanisms that they target. Thus, we compared effects of the 2 exercises on this control in healthy older adults.

**Materials and Methods:** A randomized clinical trial with 2 arms—a 6-week RE or HLE regimen—was conducted. Data were collected on 18 older adults (11 females; age range 60–82; RE n = 9; HLE n = 9) pre-treatment, post-treatment, and at 6-week follow-up, and included a VFSS and a surface electromyography (sEMG) study. Results of the VFSS showing hyolaryngeal excursion gains post both regimens have been published (Fujiki et al., 2019). The present study presents the sEMG data. Surface EMG activity was collected from the submental muscles during swallows of liquids and solids. Outcome measures were normalized mean amplitude and burst duration of swallow sEMG signal.

**Results:** Normalized amplitude and burst swallow durations did not significantly change across time for either group. Descriptively, amplitude decreased for more viscous boluses (cookie) post-exercise for both groups, but this decrease did not reach significance. In general, amplitude was higher for solids than liquids (p < 0.0001).

**Discussion:** The neuromuscular control of swallowing did not significantly change post these regimens. Given the documented gains in hyolaryngeal excursion in this sample (Fujiki et al., 2019), this may indicate that these regimens enabled the swallow to improve without the muscles needing to produce more energy. This energy conservation offers physiological support for the use of these exercises as rehabilitative or preventative approaches.

**Skill-Based Dysphagia Training As An Intervention for Individuals with Huntington’s Disease**

**Session Title:** Free Papers 5: Dysphagia-Treatment: From Brain to Esophagus

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**Background:** Dysphagia is reported in all stages of Huntington’s Disease (HD) and aspiration pneumonia is the most common cause of
death. Sparse research has evaluated dysphagia rehabilitation in this population. This study evaluated a skill-based dysphagia training protocol in individuals with HD.

**Materials and Methods:** Twelve participants with diagnosed HD and dysphagia completed 10 sessions of daily skill-based dysphagia therapy in two weeks using Biofeedback in Strength and Skill Training software and surface electromyography hardware. A within-subject A-B-A design was utilized to include two-week blocks of no treatment pre-therapy as baseline and post-therapy for retention. Swallowing was evaluated using the Timed Water Swallowing Test (TWST), Test of Masticating and Swallowing Solids (TOMASS), manofluoroscopy, ultrasound and the Swallowing Quality of Life Questionnaire (SWAL-QoL).

**Results:** Instrumental assessment of biomechanics demonstrated significant improvements in liquid bolus transit times (p < 0.05). Upper esophageal sphincter (UES) distension decreased post-therapy (p = 0.02). There were no significant treatment effects observed in the TWST and TOMASS data; however, subjectively, 5 patients reported clinical improvements, including elimination of overt signs of aspiration post-therapy. VF measures of aryepiglottic closure and UES opening duration, and manometric measures of timing and amplitude moved closer to normative data, but no significant treatment effect was found. Of the 17 outcome measures, 13 demonstrated reduced within-session variability post-therapy; these did not reach statistical significance. A significant improvement in quality of life was reported post-therapy (p < 0.05) and maintained.

**Conclusions:** This study provides preliminary evidence that this skill-based training is a feasible rehabilitation option for HD. Further evidence is required to evaluate the effectiveness of this protocol according to dysphagia signs and disease stage.

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**Esophageal Dysphagia and Reflux Symptoms Before and After Oral Iqoro Training**

Session Title: Free Papers 5: Dysphagia-Treatment: From Brain to Esophagus

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**Introduction:** IQoro Neuromuscular Training (IQNT) engages and improves function in the Upper Esophageal Sphincter (UES) and strengthens the diaphragm; it was therefore hypothesized that IQNT would treat hiatal hernia (HH) and gastroesophageal reflux disease (GERD). The aim was to examine whether IQNT improves Intermittent Esophageal Dysphagia (IED) and reflux symptoms.

**Materials and Methods:** 43 adults were consecutively referred for treatment of chronic non-stenotic IED and acid reflux; 21 patients had HH confirmed by radiological examination before enrollment, but not the remainder. All were evaluated before and after 6–8 months’ IQNT by the following tests: symptom questionnaire for IED and acid reflux symptoms; Visual Analogue Scale (VAS) for ability to swallow food; Pharyngeal Sling Force (PSF) test; Velopharyngeal Closure Test (VCT); orofacial motor and sensory tests. 12 of those with confirmed HH had high-resolution manometry recordings of pressures in the UES and hiatus canal during IQoro traction.

**Results:** At baseline, pathological IED and VAS values were reported in all, and reflux symptoms in 86%, orofacial motor- and sensory tests showed normal results thus ruling out central nervous causes. After IQNT, all results improved significantly (p < 0.001): IED in 98%; reflux symptoms and VAS in 100%. Both PSF and VCT values improved as well (p < 0.001). Mean pressure in the hiatus canal increased from 0 to 65 mmHg. There were no significant differences in test values at baseline, or in improvements after IQNT, between those with or without confirmed HH.

**Conclusion:** IQNT relieves/improves IED and reflux symptoms by improving hiatal competence.

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