



EVIDENCE SEARCH RESULTS

Question/subject of request:	Oropharyngeal dysphagia in cervical spinal injury patients
Date requested:	09/05/2025
Date completed:	06/06/2025
Compiled by:	Veronica Price

CITING THIS SEARCH

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The citation format is:

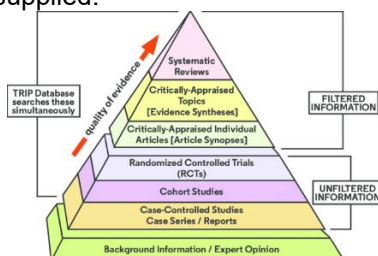
- Price, V., (2025). *Evidence summary: Oropharyngeal dysphagia in cervical spinal injury patients*. Taunton, UK: Somerset Foundation Trust Knowledge and Library Services.

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The design of the study and the endpoints measured affect the strength of the evidence.

Evidence hierarchies are often applied in evidence-based practices and are integral to evidence-based medicine.



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Contents (click to jump to each section):

- [NICE & British Society of Physical & Rehabilitation Medicine Guidance](#)
- [Systematic Reviews](#)
- [Reviews](#)
- [RCT](#)
- [Studies](#)
- [Case Series and Case Reports](#)

Summary of search results:

Please find the articles published within the past 5 years on the topic of Oropharyngeal dysphagia in cervical spinal injury patients, which I have found after searching 3 databases (Cinahl, Embase and Medline), the Cochrane Library and a google search.

If I have embedded the article link into the title, you should be able to access full text with your Open Athens account, however if the link is presented separately this indicates that we do not have full text access. If you follow the link, you should be presented with an option to request this item which will alert my library assistant colleagues to request an inter-library loan for you.

Under the broad topic of dysphagia in CSI patients, the articles discovered covered the following themes:

Assessment of dysphagia	
-surveys: BSE, Bazaz, DAISY, EAT-10, MASA, GUSS, Yale Swallow protocol, Hyodo-Komagane score	Zupo et al. 2025 , McRae et al. 2023 , Nijim et al. 2023 , McRae et al. 2022a , Dick et al. 2022 , Hamilton et al. 2022 , Kaufman et al. 2022 , Miles et al 2021 , Ohba et al. 2020
-instruments: VFSS, FEES	Zupo et al. 2025 , McRae et al. 2023 , Valenzano et al. 2023 , Hamilton et al. 2022 , Ko et al. 2022 , Ian Dhar et al. 2020
Predictive indicators of/ or risk factors for dysphagia	
Tracheal intubation, tracheostomy, physiological changes, anterior approach surgeries, difference in C ₂ - ₇ angle, post-surgical pharyngeal weakness, age, smoking, LoS in ICU,	Xu et al. 2024 , Freeman et al. 2024 , McRae et al. 2023 , McRae et al. 2022a , Miles et al. 2021 , Coutts 2021 , Huang et al. 2020 , Ian Dhar et al. 2020 , Ohba et al. 2020
Therapy & rehabilitation	
-early oral feeding exclusion, postural adaptation, oxygen therapy with high-flow nasal cannula, exercises such as chin tuck against resistance, effortful swallow, jaw opening against resistance, Mendelsohn manoeuvre, Masako Manoeuvre, and respiratory strength training, Right and left complete lateral decubitus positions, NMES,	Zupo et al. 2025 , Chung et al. 2024 , Maki et al 2023 , McRae et al.2023 , Nakao-Kato and Rathore 2023 , Dick et al. 2022 , Ko et al. 2022 , Onusko et al. 2022 , Watanabe et al. 2021 ,





laryngeal manipulation, Frazier Free Water Protocol (FFWP)	
Time course of development of dysphagia	Hayashi et al 2020
Workforce requirements for SLT	McRae et al. 2023 , McRae et al. 2022b

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NICE GUIDANCE

[Rehabilitation after traumatic injury](#)

NICE guideline Reference number:NG211 Published: 18 January 2022

[British Society of Physical & Rehabilitation Medicine Standards](#)

Published 2022

SYSTEMATIC REVIEWS

[Methods of diagnosis and rehabilitation of dysphagia in patients with spinal cord injury: a systematic review.](#)



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Authors: Zupo, Roberta;Poggi, Beatrice;Caggiano, Nicole;Varrone, Giulio;Castellana, Fabio, et al

Publication Date: Feb ,2025

Journal: European Journal of Physical & Rehabilitation Medicine 61(1), pp. 41–51

Abstract: INTRODUCTION: Latest epidemiological metrics put a global prevalence of 20.6 million people suffering from spinal cord injury (SCI), leading to a burden of functional disability, deterioration in quality of life and reduced life expectancy. A thorough statement of diagnostic methods and treatment protocols for swallowing disorders after SCI stands as a major priority to streamline patient care and cost-sharing. Here we have provided a systematic overview of the evidence on diagnostic and rehabilitation protocols of dysphagia in the SCI population. **EVIDENCE ACQUISITION:** The literature was searched in six electronic databases up to April 30th, 2024. Screening the 521 retrieved articles for inclusion criteria resulted in the selection of 43 studies that reported assessment tools and rehabilitation protocols for dysphagia in patients with SCI. Two researchers extracted the data in parallel, and inter-rater reliability (IRR) was used to estimate inter-coder agreement and then kappa statistic to measure accuracy and precision. Based on PRISMA concepts and quality assessment steps, a k coefficient of at least 0.9 was obtained in all data extraction steps. All reports were assessed for risk of bias using the NIH Quality Assessment Toolkit. The study protocol was registered on PROSPERO (CRD42023449137). **EVIDENCE SYNTHESIS:** Dysphagia assessment methods were collected and grouped into four different macro categories (clinical assessment, rating scale, self-reported questionnaire, and instrumental assessment). It was found that the Bedside Swallow Evaluation (BSE) for the clinical assessment category (50%), the Bazaz score (32.5%) for the rating scale category, the Eating Assessment Tool-10 (EAT-10) (44.4%) for the self-reported questionnaire category, and the Videofluoroscopic Study of Swallowing (VFSS) (48.9%) for the instrumental assessment category were the most representative tools. The rehabilitation protocols described included either an early oral feeding exclusion or a consistency-modified oral intake, postural adaptations, oxygen therapy with a high-flow nasal cannula combined with indirect/direct therapy, specific exercises, and neuromuscular electrical stimulation. **CONCLUSIONS:** Methods of diagnosis and rehabilitation protocols for dysphagia in SCI patients appear inconsistent. Further rigorous studies are needed to achieve better clinical handling in SCI settings while lowering the load of patient morbidity and related healthcare costs.

REVIEWS

[Oropharyngeal Dysphagia in Acute Cervical Spinal Cord Injury: A Literature Review](#)

Authors: McRae, Jackie;Morgan, Sarah;Wallace, Emma and Miles, Anna

Publication Date: Aug ,2023

Journal: Dysphagia 38(4), pp. 1025–1038

Abstract: Dysphagia (swallowing impairment) is a frequent complication of cervical spinal cord injury (cSCI). Recently published national guidance in the UK on rehabilitation after



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traumatic injury confirmed that people with cSCI are at risk for dysphagia and require early evaluation while remaining nil by mouth [National Institute for Health and Care Excellence. Rehabilitation after traumatic injury (NG211), 2022, <https://www.nice.org.uk/guidance/ng21>]. While the pathogenesis and pathophysiology of dysphagia in cSCI remains unclear, numerous risk factors have been identified in the literature. This review aims to summarize the literature on the risk factors, presentation, assessment, and management of dysphagia in patients with cSCI. A bespoke approach to dysphagia management, that accounts for the multiple system impairment in cSCI, is presented; the overarching aim of which is to support effective management of dysphagia in patients with cSCI to prevent adverse clinical consequences.

Evaluation of outcome measures for post-operative dysphagia after anterior cervical discectomy and fusion

DOI: <https://libkey.io/10.1007/s00405-023-08167-7>

Authors: Nijim, Wasef; Cowart, J. Harrison; Banerjee, Christopher; Postma, Gregory and Pare, Michel

Publication Date: Nov ,2023

Journal: European Archives of Oto-Rhino-Laryngology 280(11), pp. 4793–4801

Abstract: **PURPOSE:** The goal is to conduct a review of the current literature to determine and evaluate the current classification metrics available for quantifying post-operative dysphagia. **METHODS:** We surveyed the literature for the subjective and objective measures used to classify dysphagia, and further described and analyzed them in the context of post-operative dysphagia (PD) after anterior cervical spine surgery, with a focus on anterior cervical discectomy and fusion (ACDF). We searched PubMed from the years 2005-2021 using the terms "anterior cervical discectomy and fusion" and "dysphagia or postoperative dysphagia." We included papers that were meta-analyses, systemic reviews, prospective, or retrospective studies. Our selection was further consolidated via abstract and title screening. Ultimately, nineteen articles were included and had full-text reviews. **RESULTS:** EAT-10 tool was shown to be more valid and reliable than the commonly used Bazaz grading system. HSS-DDI was found to have a high diagnostic accuracy in stratifying mild, moderate, and severe PD. A shortened 16-item version of the original 44-item SWAL-QOL was found to be statistically and clinically significant. When compared to PROMs, objective tests more accurately diagnose PD. **CONCLUSION:** We found that the most valuable subjective tests were the EAT-10 and HSS-DI because they are quick, sensitive, and correlated strongly with the well-established measurements of PD. The MBS and FEES provided accurate measurements of the severity of PD, but they required more time and equipment than the surveys. In some patient populations, such as those with pre-surgical dysphagia, objective testing should always be done.

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[**Development of a swallowing risk screening tool and best practice recommendations for the management of oropharyngeal dysphagia following acute cervical spinal cord injury: an international multi-professional Delphi consensus.**](#)

Authors: McRae, Jackie; Smith, Christina; Beeke, Suzanne and Emmanuel, Anton



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Publication Date: 2022a

Journal: Disability & Rehabilitation 44(26), pp. 8311–8324

Abstract: **PURPOSE:** International multi-professional expert consensus was sought to develop best practice recommendations for clinical management of patients following cervical spinal cord injury with oropharyngeal dysphagia and associated complications. Additionally, risk factors for dysphagia were identified to support the development of a screening tool. **MATERIALS AND METHODS:** A two-round Delphi study was undertaken with a 27-member panel of expert professionals in cervical spinal cord injury and complex dysphagia. They rated 85 statements across seven topic areas in round one, using a five-point Likert scale with a consensus set at 70%. Statements not achieving consensus were revised for the second round. Comparative group and individual feedback were provided at the end of each round. **RESULTS:** Consensus was achieved for 50 (59%) statements in round one and a further 12 (48%) statements in round two. Recommendations for best practice were agreed for management of swallowing, respiratory function, communication, nutrition and oral care. Twelve risk factors for dysphagia were identified for components of a screening tool. **CONCLUSIONS:** Best practice recommendations support wider clinical management to prevent complications and direct specialist care. Screening for risk factors allows early dysphagia identification with the potential to improve clinical outcomes. Further evaluation of the impact of these recommendations is needed. Implications for Rehabilitation Dysphagia is an added complication following cervical spinal cord injury (cSCI) affecting morbidity, mortality and quality of life. Early identification of dysphagia risk allows focused interventions that reduce associated nutritional and respiratory impairments. Best practice recommendations based on expert consensus provide a baseline of appropriate interventions, in the absence of empirical evidence. A multi-professional approach to rehabilitation encourages a consistent and coordinated approach to care across acute and rehabilitation settings.

[Dysphagia in cervical spinal cord injury: How international literature trends can guide South African practice patterns – A scoping review](#)

Authors: Coutts, Kim A.

Publication Date: 2021

Journal: South African Journal of Physiotherapy 77(1), pp. 1–7

Abstract: Background: The limited data regarding dysphagia in high-level spinal cord injuries (SCIs) stem from economically developed countries. Dysphagia is prevalent in patients with cervical SCI; however, in a South African context, speech-language pathologists (SLPs) are not seen as key when managing this population. This may result in patients not being screened or identified early, leading to possible complications. The literature could provide useful insight on how best to address this clinical gap. Objectives: The aim of my study was to conduct a scoping review on the description of dysphagia, the risk factors for developing dysphagia post-SCI and the practice patterns of team members working with dysphagia in cervical SCIs. Methods: A five-step scoping review was undertaken. Data were analysed by using descriptive statistics as well as a thematic analysis by using a top-down approach. Results: Through the process of screening according to the inclusion and exclusion criteria, 25 articles were included. Primarily, the pharyngeal phase was affected, which can lead to an aspiration pneumonia. The key risk factors were the presence of a tracheostomy tube, the use of ventilation and anterior spinal cord surgery. There was little mention regarding specific practice patterns, but an interdisciplinary



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approach was suggested as the most efficient model. Conclusions: Specific guidelines and management options need to be considered for a South African context, given the high incidence of trauma-related injuries. There needs to be locally produced research, providing suggestions on how different team members can screen and identify dysphagia within this population. Solutions need to be unique, and contextually responsive and appropriate. Clinical implications: The team members and the roles of these different team members need to be re-examined in order to ensure the early identification and management of cervical SCI patients who are at risk of developing a dysphagia.

RCT

[Efficacy of Laryngeal Rehabilitation Therapy on Dysphagia after Anterior Cervical Surgery: Prospective, Randomized Control Trial.](#)

Authors: Ko J.H.; Han K.S. and Yoon, S. J.

Publication Date: 2022

Journal: Journal of Clinical Medicine 11(9) (pagination), pp. Article Number: 2470. Date of Publication: 01 May 2022

Abstract: Dysphagia is the most common complication of anterior cervical discectomy and fusion (ACDF). Several studies have reported dysphagia's incidence, severity, and prognosis after ACDF; however, few have investigated the objective effects of dysphagia management. We aimed to elucidate the efficacy of laryngeal rehabilitation therapy for dysphagia following ACDF. This prospective randomized control trial included 20 patients who underwent more than two-level ACDF. Laryngeal rehabilitation therapy was performed on 10 patients for 7 days, whereas the remaining 10 comprised the control group. Pharyngeal transit time (PTT) by videofluoroscopic swallowing study (VFSS) was performed to evaluate the objective state of swallowing. We analyzed Bazaz scale and total variance of prevertebral soft tissue swelling (PSTS) from C2 to C7 on lateral cervical radiographs during hospitalization and at 4 and 8 weeks post-surgery. The PTT of the rehabilitation group was shorter than that of the control group at 7 days and 4 weeks post-surgery (p-value; POD 7D = 0.003, POD 4W = 0.042, POD 8W = 0.097). Perioperative laryngeal rehabilitation therapy effectively reduces postoperative dysphagia after ACDF.

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STUDIES

Coordination Between Respiration and Swallowing in Patients With Dysphagia After Cervical Spinal Cord Injury: An Observational Case-Control Study.

DOI: https://libkey.io/10.1044/2024_AJSLP-24-00135

Authors: Xu, Xuluan; Zhang, Qingsu; Xie, Yongqi; Yang, Degang; Gao, Feng, et al

Publication Date: Sep 18, 2024

Journal: American Journal of Speech-Language Pathology 33(5), pp. 2572–2581



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Abstract: PURPOSE: The purpose of the present study was to characterize the differences between respiration and swallowing in patients with dysphagia after cervical spinal cord injury (CSCI) and to explore the underlying physiological changes. **METHOD:** A total of 95 participants were recruited for bedside swallowing evaluation followed by a flexible endoscopic evaluation of swallowing and surface electromyography with a thermocouple nasal airflow sensor examination: 32 with dysphagia, 33 without dysphagia, and 30 healthy controls. The differences in respiratory patterns, swallowing apnea duration (SAD), inspiratory-expiratory ratio, and swallowing efficiency were observed among healthy adults, CSCI patients with and without dysphagia after CSCI. **RESULTS:** Compared with those of healthy controls and patients without dysphagia after CSCI, the postswallow respiratory pattern of patients with dysphagia after CSCI was an inspiratory pattern, and the SAD was significantly shorter in patients with dysphagia after CSCI ($p < .05$). **CONCLUSION:** Patients with CSCI have an inspiratory pattern after swallowing, and the SAD is significantly reduced; SAD can be used as the predictor of dysphagia in patients after CSCI; the pattern of coordination between respiration and swallowing in patients with dysphagia after CSCI is different from that of healthy controls and patients without dysphagia after CSCI. **SUPPLEMENTAL MATERIAL:** <https://doi.org/10.23641/asha.26524717>.

Prevalence, recovery, and factors associated with dysphagia in an older critically ill trauma cohort: A cross-sectional study

DOI: <https://libkey.io/10.1016/j.aucc.2023.10.005>

Authors: Freeman-Sanderson, Amy;Crisp, Janae;Hodgson, Carol L.;Holland, Anne E.;Harrold, Meg, et al

Publication Date: 2024

Journal: Australian Critical Care 37(6), pp. 957–963

Abstract: Patients admitted to the intensive care unit (ICU) following trauma often have multiple injuries, which can lead to disordered swallowing, dysphagia. The prevalence of dysphagia in trauma populations ranges between 4.2% and 86%; however, clinical and associated longitudinal health outcomes and patient-reported quality of life are unknown. The objective of this study was to compare hospital and clinical outcomes for older critically ill trauma patients diagnosed with and without dysphagia up to 12 months after hospital admission. Secondary outcomes include characteristics of dysphagia assessment and recovery during indexed hospital admission. Post hoc analysis of an observational study. All patients were recruited from a tertiary ICU trauma unit, all were aged above 50 years, with an expected ICU length of stay of >24 h. Criteria of dysphagia diagnosis were determined via presence of International Classification of Diseases (ICD-10) code (R13). Hospital, clinical, and health-reported quality-of-life data were collected. Ninety-eight patients were included with 79 (81%) being male, overall median injury severity scale: 21.5 (interquartile range: 14–29); 38 (38.8%) with spinal injury, 37 (37.8%) with multitrauma excluding head injury, and 23 (23.5%) with multitrauma including head injury. Prevalence of dysphagia was 29%, with patients diagnosed with dysphagia more likely to have required invasive mechanical ventilation (odds ratio [OR]: 4.0, 95% confidence interval [CI]: 1.25–12.78), for an increased duration (OR: 2.6, 95% CI: 0.27–4.92) and required longer ICU admission (OR: 2.98, 95% CI: 0.28–5.69). Recovery of swallow function was protracted beyond the indexed hospital admission, with only 18% of those diagnosed with dysphagia returning to a normal, unrestricted, oral diet by hospital discharge. At 6 and 12 months, functional disabilities were reported across the cohort with no significant differences between groups. In older critically ill trauma patients, dysphagia is common. Use and duration of invasive mechanical



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ventilation and increased ICU length of stay for survivors were significantly increased for those with dysphagia. Management of swallowing is required across the continuum of care commencing in and beyond ICU to optimise recovery and outcomes.

[An Overview Of The Management And Rehabilitation Of Dysphagia](#)

Authors: Nakao-Kato, Mari and Rathore, Farooq Azam

Publication Date: Aug ,2023

Journal: JPMA - Journal of the Pakistan Medical Association 73(8), pp. 1749–1752

Abstract: Dysphagia is a medical condition that makes it difficult for a person to eat or swallow. It is estimated that 590 million people worldwide have dysphagia. The causes are varied and include neurological disorders like stroke and motor neuron disease, head and neck cancer, neuromuscular diseases, inflammatory diseases such as dermatomyositis, dementia, cervical spinal cord injury, and anterior vertebral ossification. The assessment and screening of dysphagia consists of a questionnaire-based interview, mealtime observation, and, if deemed necessary by a screening test or instrumental examination by specialists. Treatment is based on the diagnosis, patients' cognition and information gathered by screening and clinical evaluation. Patient's function can be improved only when treatment is comprehensive and includes compensatory feeding using an adjusted swallowing diet, compensatory posture adjustment, and nutritional improvement. We present a brief overview of the assessment and management strategies for dysphagia.

[Successful Continuation of Oral Intake in a Dysphagic and Tetraplegic Patient With Alternate Right and Left Complete Lateral Decubitus Positions in Rehabilitation](#)

Authors: Maki, Yoshinori; Takagawa, Mayumi; Goda, Akio; Katsura, Junichi and Yanagibashi, Ken

Publication Date: May 7 ,2023

Journal: Cureus 15(5), pp. e38667

Abstract: Cervical spinal cord injury can result in dysphagia and tetraplegia. Dysphagia therapy can be required to avoid aspiration pneumonia during oral intake for persons with cervical spinal cord injury. Complete lateral decubitus position may be a specific position for safe swallowing. However, the literature on dysphagia therapy in complete lateral decubitus position for persons with tetraplegia and dysphagia is limited. We present the case of a 76-year-old man with dysphagia and tetraplegia secondary to cervical cord injury. As the patient wished for oral intake, swallowing training in an elevated position of the head at 60° was already initiated. Two days after admission, aspiration pneumonia occurred. As the spasticity increased continuously, the patient could not comfortably undertake swallowing training in an elevated head position of 60°. The flexible endoscopic evaluation of swallowing (FEES) was performed for the patient. The patient did not swallow water or jelly safely in an elevated head position. However, the patient swallowed jelly safely in the right complete lateral decubitus position. Two months after the initiation of oral intake in the right complete lateral decubitus position, the second FEES revealed that the patient swallowed jelly and food in the form of paste safely in the left complete lateral decubitus position. To relieve the pain of the right shoulder induced by continuous right complete lateral decubitus position, the patient



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retained oral intake in the left or right complete lateral decubitus position alternately for six months without recurrent aspiration pneumonia. Right and left complete lateral decubitus positions when alternately performed in swallowing training can be useful and safe for a patient with dysphagia and tetraplegia secondary to cervical spinal cord injury.

[Speech and language therapy service provision in spinal injury units compared to major trauma centres in England: Are services matched?](#)

Authors: McRae, Jackie; Hayton, Jennifer and Smith, Christina

Publication Date: 2022b

Journal: International Journal of Language & Communication Disorders 57(1), pp. 6–20

Abstract: BACKGROUND: National UK guidance makes recommendations for speech and language therapy staffing levels in critical care and rehabilitation settings. Traumatic spinal cord injury patients often require admission primarily to critical care services within a major trauma centre prior to transfer to a specialist spinal injury unit but may not receive similar levels of care. Dysphagia and communication difficulties are recognised features of cervical spinal cord injury; however, little is known about access to speech and language therapy services to provide rehabilitation and improve outcomes. **AIMS:** The aim of this study was to compare the workforce and clinical practices of speech and language therapy services in eight spinal injury units and four major trauma centres in England through an online survey. **METHODS & PROCEDURES:** An online survey was created with 26 multiple-choice questions across seven sub-sections, with options for free-text comments. These were sent to a named speech and language therapy contact at each of the specified units. Responses were uploaded into Excel for analyses, which included descriptive statistics and analysis of themes. **OUTCOMES & RESULTS:** Responses were received from 92% (11/12) speech and language therapy services invited, which included seven out of eight spinal injury units and all four major trauma centres. No units met national staffing recommendations. Staff in spinal injury units provided an average of 27 h per week input to the unit compared to 80 h in a major trauma centre. Despite caseload variations, speech and language range of therapy involvement and prioritisation process were equivalent. Access to instrumental assessment varied, with less use of Fibreoptic Endoscopic Evaluation of Swallowing in spinal injury units despite its clinical value to the spinal cord injury caseload. **CONCLUSIONS & IMPLICATIONS:** Speech and language therapy services delivering post-acute and long-term rehabilitation to spinal cord injury patients are limited by their resources and capacity, which restricts the level of therapy delivered to patients. This may have an impact on clinical outcomes for communication and swallowing impairments. Further evidence is needed of the interventions delivered by speech and language therapists and outcomes will be beneficial alongside benchmarking similar services. **WHAT THIS PAPER ADDS:** What is already known on this subject In England, people who sustain a spinal cord injury are admitted to a major trauma centre prior to transfer to a specialist spinal injury unit. Dysphagia and communication impairments are recognised as a complication of cervical spinal cord injury and benefit from speech and language therapy intervention. National recommendations exist for staffing levels, expertise and competencies for speech and language therapists working in critical care and rehabilitation units. What this study adds This study identified variations in the levels of speech and language therapy staffing, seniority, service delivery and access to instrumental assessments for dysphagia between major trauma centres and spinal injury units. None of the services complied with national staffing recommendations. Clinical implications of this study Speech and language therapy services in spinal injury units are





often available part-time or have limited access to diagnostic tools which limits the range and intensity of rehabilitation input available. This has clinical implications for outcomes for swallowing and communication as well as long-term consequences for integrating back into community.

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[Videofluoroscopic Profiles of Swallowing and Airway Protection Post-traumatic Cervical Spinal Cord Injury.](#)

Authors: Hamilton V.K.;Pitts L.L.;Walaszek E.A. and Cherney, L. R.

Publication Date: 2022

Journal: Dysphagia 37(6), pp. 1599–1611

Abstract: Videofluoroscopic analyses of swallowing in survivors of traumatic cervical spinal cord injury (tCSCI) have been largely limited to case reports/series and qualitative observations. To elucidate the disrupted physiology specifically underlying dysphagia post-tCSCI, this prospective observational study analyzed videofluoroscopic swallow studies (recorded at 30 frames per second) across 20 tCSCI survivors. Norm-referenced measures of swallow timing or displacement, and calibrated area measures of laryngeal vestibule closure (LVC) were explored in relation to the severity of aspiration or pharyngeal residue. Videofluoroscopic performance was compared by injury level, surgical intervention, tracheostomy status, and in relation to clinical bedside assessments. Reduced pharyngeal constriction, delayed hyoid elevation, and impaired LVC characterized post-tCSCI dysphagia. Reduced extent of hyoid excursion and of pharyngoesophageal segment (PES) opening were not as prominent, only present in approximately half or less of the sample. Ten participants aspirated and 94% of aspiration events were silent. Severity of aspiration significantly correlated with pharyngeal constriction and prolonged pharyngeal transit times. Post-swallow residue correlated with delayed PES distention/closure and prolonged pharyngeal transit. Clinical inference regarding the integrity of the pharyngeal phase at bedside was limited; however, EAT-10 scores demonstrated promise as an adjuvant clinical marker of post-tCSCI dysphagia. This exploratory study further describes the pathophysiology underlying post-tCSCI dysphagia to promote deficit-specific rehabilitation and functional recovery.

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Critical analysis of the evaluation of postoperative dysphagia following an anterior cervical discectomy and fusion.

DOI: <https://libkey.io/10.1016/j.amjoto.2022.103466>

Authors: Kaufman M.;Shearer J.;Cabrera C.I.;Terry M.;Jackson E., et al

Publication Date: 2022

Journal: American Journal of Otolaryngology - Head and Neck Medicine and Surgery 43(3) (pagination), pp. Article Number: 103466. Date of Publication: 01 May 2022



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Abstract: Background and purpose: Postoperative dysphagia is a known complication of anterior cervical discectomy and fusion (ACDF) with reported incidences ranging from 1 to 79%. No standardized guidelines exist for spine surgeons to evaluate postoperative dysphagia after ACDF. A systematic method may be beneficial in distinguishing transient postoperative dysphagia secondary to intubation from those with postoperative complications. This study evaluates the causes, recognition, and clinical evaluation of postoperative dysphagia following ACDF.

Method(s): International classification of disease (ICD) and current procedural terminology (CPT) codes were used to identify ACDF patients and compared to anterior lumbar discectomy and fusion (ALDF), serving as a control group, between the years 2015-2019 and those diagnosed with dysphagia within 1 year. Demographics, operative details, and clinical evaluation were reviewed. Exclusion criteria included history of head and neck procedures, cancer, stroke, radiation, and trauma.

Result(s): One hundred thirty-one ACDF and 93 ALDF patients met inclusion criteria. Twenty-seven (20.6%) ACDF patients were diagnosed with dysphagia within 1 year. Less than half of the dysphagia patients had the word "dysphagia" documented in their 1-month spine surgeon follow up visit. Only 66% of dysphagia patients had specialist evaluation and one third of those patients were referred by their surgeon. Only six patients received diagnostic barium swallow evaluations.

Conclusion(s): Postoperative dysphagia risk increases in ACDF compared to ALDF, likely due to underlying anatomy. Postoperative dysphagia symptoms are not effectively documented by spine surgeons and as a result underevaluated by dysphagia specialists. Patients may benefit from more extensive pre- and post-operative screening, evaluation, and referral regarding dysphagia symptoms following ACDF.

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Cervical Osteophytes Causing Dysphagia.

DOI: <https://libkey.io/10.1016/j.amjms.2020.10.014>

Authors: Bakshi, Satvinder Singh and Ramesh, Seepana

Publication Date: 2021

Journal: American Journal of the Medical Sciences 361(5), pp. e43

Characterizing dysphagia after spinal surgery.

Authors: Miles, Anna; Jamieson, Gabi; Shasha, Lara and Davis, Kelly

Publication Date: 2021

Journal: Journal of Spinal Cord Medicine 44(5), pp. 733–741

Abstract: Context/Objective: Dysphagia after spinal surgery is well recognised. Characteristics of post-operative dysphagia are not well defined. This study explored severity, longevity, and physiological characteristics of dysphagia. **Design:** Prospective, observational study. **Setting:** Tertiary urban hospital. **Participants:** Two-hundred fifty patients consecutively receiving spinal surgery. **Interventions:** Demographic and clinical information were collected. Flexible endoscopic evaluation of swallowing (FEES) and videofluoroscopic study of swallowing (VFSS) recordings were analyzed. **Outcomes**



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Measures: FEES recordings were analyzed using three validated symptom scales. VFSS recordings were analyzed using 10 objective digital measures of timing, displacement and symptoms.

Results: Of 250 patients, 75 were referred for swallowing assessment. Sixty-two received FEES and 11 VFSS. Patients with anterior approach surgery for cervical level injuries represented 85% of referrals ($n = 64$). Secretion accumulation, aspiration and residue scores decreased significantly within 2 months for most patients. For those with persisting dysphagia, objective VFSS measures demonstrated significant impairments in pharyngeal constriction, hyoid displacement and pharyngoesophageal segment opening with corresponding residue and aspiration scores. By 6 months, all patients had returned to a regular diet except three patients following anterior cervical discectomy and fusion (ACDF) who remained nil by mouth with severe physiological impairments.

Conclusions: A quarter of patients following spinal surgery present with dysphagia. For most, symptoms decrease significantly by 2 months and patients return to normal diets. Early screening of dysphagia is critical to avoid secondary complications and prolonged hospitalizations. For some, significant pharyngeal impairments persist and high-quality case series exploring efficacy of rehabilitation programmes are needed.

[The effect of the difference in C₂₋₇ angle on the occurrence of dysphagia after anterior cervical discectomy and fusion with the zero-P implant system.](#)

Authors: Huang, Cheng-Yi;Meng, Yang;Wang, Bei-Yu;Yu, Jie;Ding, Chen, et al

Publication Date: Oct 06 ,2020

Journal: BMC Musculoskeletal Disorders 21(1), pp. 649

Abstract: OBJECTIVES: To investigate the effect of the difference in C₂₋₇ angle on dysphagia after anterior cervical discectomy and fusion (ACDF) with the Zero-P Implant System. **METHODS:** A retrospective analysis of 181 patients who underwent ACDF with the Zero-P Implant System and had at least one year of follow-up from January 2011 to November 2018 was performed. All patients were divided into a non-dysphagia group and a dysphagia group to explore the effect of the difference between postoperative and preoperative C₂₋₇ angle (dC₂₋₇A) on postoperative dysphagia. At the same time, other possible related factors including the difference between postoperative and preoperative O-C2 angle (dO-C2A), sex, age, body mass index (BMI), intraoperative time, estimated blood loss, diabetes mellitus, hypertension, smoking, alcohol consumption, prevertebral soft-tissue swelling (PSTS), the highest segment involved in the surgery and the levels of surgery segments were analyzed. **RESULTS:** In total, the non-dysphagia group comprised 139 patients and the dysphagia group comprised 42 patients. The single-factor analysis showed that smoking, PSTS and dC₂₋₇A were significantly different between the two groups (P A were significantly different between the two groups (P₂₋₇A (P > 0.05). The results of the multiple-factor analysis with an ordinal logistic regression model showed that smoking, PSTS and dC₂₋₇A were significantly associated with the incidence of dysphagia (P A were significantly associated with the incidence of dysphagia (P **CONCLUSIONS:** The postoperative C₂₋₇ angle has an important effect on the occurrence of dysphagia in patients undergoing Zero-P implant system interbody fusion surgery.

Fluoroscopic Swallowing Abnormalities in Dysphagic Patients Following Anterior Cervical Spine Surgery.

DOI: <https://libkey.io/10.1177/0003489420929046>



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Authors: Ian Dhar, Shumon;Wegner, Adam M.;Rodnoi, Pope;Wuellner, John C.;Mehdizadeh, Omid Benjamin, et al

Publication Date: Nov ,2020

Journal: Annals of Otolaryngology, Rhinology & Laryngology 129(11), pp. 1101–1109

Abstract: **OBJECTIVES:** To evaluate the precise objective fluoroscopic abnormalities in persons with dysphagia following anterior cervical spine surgery (ACSS). **METHODS:** 129 patients with dysphagia after ACSS were age and sex matched to 129 healthy controls. All individuals underwent videofluoroscopic swallow study (VFSS). VFSS parameters abstracted included upper esophageal sphincter (UES) opening, penetration aspiration scale (PAS), and pharyngeal constriction ratio (PCR). Other data collected included patient-reported outcome measures of voice and swallowing, number of levels fused, type of plate, vocal fold immobility, time from surgery to VFSS, and revision surgery status. **RESULTS:** The mean age of the entire cohort was 63 (SD +/- 11) years. The mean number of levels fused was 2.2 (+/-0.9). 11.6% (15/129) were revision surgeries. The mean time from ACSS to VFSS was 58.3 months (+/-63.2). The majority of patients (72.9%) had anterior cervical discectomy and fusion (ACDF). For persons with dysphagia after ACSS, 7.8% (10/129) had endoscopic evidence of vocal fold immobility. The mean UES opening was 0.84 (+/-0.23) cm for patients after ACSS and 0.86 (+/-0.22) cm for controls ($P > .0125$). Mean PCR was 0.12 (+/-0.12) for persons after ACSS and 0.08 (+/-0.08) for controls, indicating significant post-surgical pharyngeal weakness ($P < .05$). **CONCLUSION:** Chronic swallowing dysfunction after ACSS appears to be secondary to pharyngeal weakness and not diminished UES opening, the presence of aspiration, vocal fold immobility, or ACSS instrumentation factors. **Level of Evidence:** 3b.

Risk Factors and Assessment Using an Endoscopic Scoring System for Early and Persistent Dysphagia After Anterior Cervical Decompression and Fusion Surgery.

DOI: <https://libkey.io/10.1097/BSD.0000000000000945>

Authors: Ohba, Tetsuro;Hatsushika, Kyousuke;Ebata, Shigeto;Koyama, Kensuke;Akaike, Hiroshi, et al

Publication Date: 2020

Journal: Clinical Spine Surgery : A Spine Publication 33(4), pp. E168–E173

Abstract: **STUDY DESIGN:** Prospective study. **OBJECTIVES:** Preoperative and postoperative dysphagia was evaluated by an otolaryngology doctor and a speech-language-hearing therapist using the eating assessment tool (EAT-10) and Hyodo-Komagane scores. The objective was to achieve a more precise evaluation of the incidence and risk factors of early and persistent dysphagia after anterior cervical discectomy and fusion (ACDF). **SUMMARY OF BACKGROUND DATA:** Although numerous reports have explored the risk factors for dysphagia after ACDF, these factors remain controversial. The main reason for this situation is that the methods for evaluating dysphagia are not adequate or uniform. **MATERIALS AND METHODS:** This study involved a retrospective 47 consecutive patients who had undergone ACDF and been followed up for at least 1 year. Sagittal alignment of the cervical spine was evaluated by a preoperative x-ray. Univariate and multivariate logistic regression analyses were performed to determine risk factors for



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transient or persistent dysphagia. **RESULTS:** The study showed that 34% of patients developed dysphagia in the early postoperative period and that 25.5% of patients still had persistent dysphagia 1 year postoperatively. 8.5% of patients had already developed dysphagia preoperatively, with a significant positive correlation observed between preoperative and postoperative dysphagia. Aging and smoking were significant risk factors for transient dysphagia. A preoperative cervical kyphotic angle at the C3/C4, C4/C5 disk-level and change in the kyphotic angle at C4/C5 during surgery were significant risk factors of persistent dysphagia 1 year after surgery. **CONCLUSIONS:** This is the first study to show dysphagia after anterior cervical spine surgery using the EAT-10 score and Hyodo-Komagane score with endoscopic evaluation. Aging and smoking were significant risk factors for transient dysphagia, while preoperative local kyphosis angles of C3-C4 and C4-C5 and change in the kyphotic angle at C4/C5 during surgery may be a key alignment of risk factors for postoperative persistent dysphagia. **LEVEL OF EVIDENCE:** Level: III.

[Is the likelihood of dysphagia different in patients undergoing one-level versus two-level anterior cervical discectomy and fusion?](#)

Authors: Vaishnav, Avani S.;Saville, Philip;McAnany, Steven;Haws, Brittany;Singh, Kern, et al

Publication Date: 2020

Journal: Spine Journal: Official Journal of the North American Spine Society 20(5), pp. 737–744

Abstract: BACKGROUND CONTEXT: Dysphagia following anterior cervical discectomy and fusion (ACDF) is a common complication, the etiology of which has not been established. Given that one potential mechanism for dysphagia is local tissue edema, it is thought that a greater number of operative levels may result in higher dysphagia rates. However, prior reports comparing one-level to two-level ACDF have shown varying results. **PURPOSE:** To determine if there is a difference in dysphagia between one-level and two-level ACDF. **STUDY DESIGN/SETTING:** Retrospective review of prospectively collected data. **PATIENT SAMPLE:** Patients who underwent one- or two-level ACDF with a plate-graft construct by a single-surgeon at a high-volume academic medical center. **OUTCOME MEASURES:** Neck Disability Index, Visual Analog Scale for neck pain and arm pain, Short Form-12 physical and mental health components, and Swallowing Quality of Life (SWAL-QOL) Questionnaire. **METHODS:** Patient demographics, operative data, and patient-reported outcome measures (PROMs; Neck Disability Index, Visual Analog Scale, Short Form-12, and SWAL-QOL) of patients undergoing one- and two-level ACDF were compared using Fisher exact test for categorical variables and Student's t test for continuous variables. Regression analyses were conducted to identify factors associated with 6- and 12-week SWAL-QOL scores in order to determine whether the number of surgical levels impacts these outcomes. **RESULTS:** Fifty-eight patients (22 one-level and 36 two-level ACDF) were included. Patients undergoing two-level fusions were older (54.17+8.67 vs 48.06+10.68 years, $p=.02$) and had longer operative times (69.08+10.51 vs 53.5+14.35 minutes, $p=.02$). Fifty-eight patients (22 one-level and 36 two-level ACDF) were included. Patients undergoing two-level fusions were older (54.17+8.67 vs 48.06+10.68 years, $p=.02$) and had longer operative times (69.08+10.51 vs 53.5+14.35 minutes, $p=.02$). Patients undergoing two-level fusions had a sensitivity and specificity of 62.1% for worse dysphagia scores at 6 weeks compared with baseline. **CONCLUSIONS:** The results of our study indicate that there is no difference in the degree of postoperative dysphagia in one- versus two-level ACDF. However, other variables associated with





increased postoperative dysphagia in our population included younger age, male sex, procedural time >61.5 minutes, and worse preoperative dysphagia. Larger studies are required to confirm these findings and identify additional risk factors for postoperative dysphagia.

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[The time course of dysphagia following traumatic cervical spinal cord injury: a prospective cohort study](#)

Authors: Hayashi, Tetsuo;Fujiwara, Yuichi;Sakai, Hiroaki;Kubota, Kensuke;Kawano, Osamu, et al

Publication Date: 2020

Journal: Spinal Cord 58(1), pp. 53–57

Abstract: Study design: Prospective cohort study. Objectives: To elucidate serial changes in dysphagia and elucidate the critical period for dysphagia following acute traumatic cervical spinal cord injury (CSCI). Setting: Spinal Injuries Center, Fukuoka, Japan. Methods: We prospectively examined individuals with acute traumatic CSCI admitted within 2 weeks after injury. Severity of dysphagia was evaluated using both the dysphagia severity scale (DSS) and functional oral intake scale (FOIS) at 2 weeks, 1 month, 2 months, and 3 months after injury. Condition of oral intake before injury was assessed by history taking. American Spinal Injury Association (ASIA) impairment scale grade and motor scores were also assessed at the same timepoints, and the correlation between dysphagia and paresis was analyzed. Results: Sixty-five individuals with CSCI were assessed consecutively for 3 months after injury. Swallowing function, evaluated using both the DSS and FOIS, was significantly decreased at 2 weeks after injury, but significantly improved thereafter. Significant correlations between severity of dysphagia (DSS and FOIS scores) and motor scores were found at 2 weeks after injury ($r_s = 0.66$ and 0.61 ; $p < 0.001$ and $p < 0.001$, respectively), indicating that individuals with lower motor scores had more severe swallowing dysfunction. Conclusions: Dysphagia occurred immediately after injury, but gradually improved over time. Individuals with more severe paralysis had significantly more severe dysphagia. Special attention for dysphagia should be paid to individuals with severe paralysis in acute phase.

CASE SERIES AND CASE REPORTS

[Compensatory strategies of dysphagia after anterior cervical spinal surgery: A case report.](#)

Authors: Chung, Sung Joon;Lee, Jun Ho and Soh, Yunsoo

Publication Date: Jul 19 ,2024

Journal: Medicine 103(29), pp. e39016

Abstract: RATIONALE: Dysphagia after anterior cervical discectomy and fusion (ACDF) is a common postoperative complication. However, information regarding rehabilitation strategies for postoperative dysphagia is limited. Herein, we report a compensatory strategy for treating dysphagia after ACDF. **PATIENT CONCERNS:** A 65-year-old Asian male presented with left arm pain and weakness for more than 1 month. Magnetic resonance



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imaging of the cervical spine revealed degenerative disc lesions and spinal stenosis at the C3 to C7 levels. The patient underwent ACDF at the C3 to C5 levels and artificial disc replacement at the C5 to C7 levels by right side approach. After surgery, the patient complained of difficulty swallowing. A video fluoroscopic swallowing study (VFSS) detected swallowing dysfunction in the pharyngeal phase, revealing an asymmetric pharyngeal residue in the anterior-posterior view. **DIAGNOSIS:** The patient was diagnosed with dysphagia after ACDF. **INTERVENTIONS:** Based on the VFSS findings, the patient underwent swallowing rehabilitation therapy and compensatory techniques, such as head rotation to the weak right side and head tilting to the robust left side. **OUTCOMES:** After 2 months of rehabilitation with compensatory techniques, food moved smoothly towards the robust side, and the subjective symptoms of dysphagia improved. **LESSONS:** Consequently, swallowing function post-ACDF surgery must be assessed; if unilateral dysphagia is detected, compensatory techniques may prove beneficial. This case study showed that, based on the objective findings of the VFSS, an effective swallowing compensation strategy can be established and applied to patients with postoperative dysphagia.

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Case Report: Glossopharyngeal Allodynia-Related Odynophagia and Dysphagia Post Anterior Cervical Discectomy and Fusion Managed with Glossopharyngeal Nerve Block.

DOI: <https://libkey.io/10.1213/XAA.0000000000001849>

Authors: Pokuri, Krishna;Fonseca, Alexandra;Raj, Vijay;Tolba, Reda;Kollenburg, Linda, et al

Publication Date: Sep 01 ,2024

Journal: A&A Practice 18(9), pp. e01849

Abstract: Dysphagia after anterior cervical spine surgery has a 5% to 15% incidence beyond 1-year postsurgery, often attributed to mechanical factors such as pharyngeal thickening and epiglottis inversion. Despite normal neurological examination and electromyography, nerve distortion related to stretching also remains a possibility in these patients and may cause allodynia resulting in odynophagia and dysphagia. Current treatment options for dysphagia after anterior cervical discectomy and fusion are limited to local intraoperative steroid injections and tracheal traction exercises. In our patient, a glossopharyngeal nerve block was effectively used to manage the glossopharyngeal allodynia, thereby reducing the odynophagia and dysphagia, ultimately enhancing oral tolerance.

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[Using Reference Values to Identify Profiles of Swallowing Impairment in a Case Series of Individuals With Traumatic Spinal Cord Injury](#)

Authors: Valenzano, Teresa J.;Smaoui, Sana;Peladeau-Pigeon, Melanie;Barbon, Carly E. A.;Craven, B. C., et al

Publication Date: 2023

Journal: American Journal of Speech-Language Pathology 32(2), pp. 688–700



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Abstract: Purpose: In this article, we illustrate use of a systematic approach to rating videofluoroscopic swallowing studies (VFSS), the Analysis of Swallowing Physiology: Events, Kinematics and Timing (ASPEKT) method. The method is applied to a clinical case series of individuals with a history of traumatic spinal cord injury (tSCI) requiring surgical intervention using a posterior approach. Previous studies suggest that swallowing is highly variable in this population given heterogeneity in mechanisms, location and extent of injury, and in surgical management approaches. Method: The case series involved 6 individuals who were at least 1 month postsurgery for management of tSCI. Participants completed a VFSS using a standardized bolus protocol. Each VFSS was blindly rated in duplicate using the ASPEKT method and compared with published reference values. Results: The analysis revealed considerable heterogeneity across this clinical sample. Penetration–aspiration scale scores of 3 or higher were not observed in this cohort. Of note, patterns of impairment did emerge, suggesting there are some commonalities across profiles in this population, including the presence of residue associated with poor pharyngeal constriction, reduced upper esophageal opening diameter, and short upper esophageal sphincter opening duration. Conclusions: Although the participants in this clinical sample shared a history of tSCI requiring surgical intervention using a posterior approach, there was great heterogeneity in swallowing profile. Using a systematic method to identify atypical swallowing parameters can guide clinical decision making for determining rehabilitative targets and measuring swallowing outcomes.

[Swallowing rehabilitation following spinal injury: A case series.](#)

Authors: Dick, Shaolyn; Thomas, Jess; McMillan, Jessica; Davis, Kelly and Miles, Anna

Publication Date: 2022

Journal: Journal of Spinal Cord Medicine 45(1), pp. 65–75

Abstract: Context/objective: Swallowing difficulties (dysphagia) are well recognized after spinal injury. There are no published rehabilitation efficacy studies to date. This study explored viability and outcomes of swallowing rehabilitation programs for four patients with persisting dysphagia. **Design:** Prospective, quantitative experimental longitudinal case series. **Setting:** Spinal rehabilitation unit or patients' homes. **Interventions:** Four patients engaged in a 6-week (3xweekly) individualized progressive rehabilitation program. **Outcome measures:** Objective videofluoroscopic measures of timing and displacement and a validated self-reported questionnaire - the Eating Assessment Tool (EAT-10) were taken pre-therapy, immediately post-therapy and EAT-10 was repeated at 3 months. Feeling and fatigue scale scores were taken before and after each therapy session.

Results: Patients (63, 67 yr, 67 yr, 76 yr; 3 male) had varying spinal diagnoses (2 traumatic, all involving the C-spine) and length of dysphagia (6 weeks, 6 weeks, 12 weeks, 10 yr). Common physiological impairments across all patients were: reduced maximum hyoid displacement, reduced pharyngeal constriction and reduced pharyngoesophageal segment maximum opening. Therapy programs were well received with 100% compliance. Participants made quantitative improvements in their videofluoroscopic measures of timing and displacement. Three out of four participants were able to have their percutaneous endoscopic gastrostomies (PEG) removed. EAT-10 scores significantly improved for all patients ($P < .001$). Poor upper limb function and restricted neck flexion prohibited some exercises.

Conclusions: For many patients following spinal injury, dysphagia resolves during the acute



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phase of post-surgery recovery. For some, significant pharyngeal impairments persist. This case series demonstrates potential to regain functional swallowing following a 6-week tailored rehabilitation program. High-quality research exploring efficacy of rehabilitation programs are warranted.

[High-flow nasal cannula oxygen therapy was effective for dysphagia associated with respiratory muscle paralysis due to cervical spinal cord injury: A case report.](#)

Authors: Watanabe, Yoshihiro; Tamura, Toshiaki; Imai, Ryota; Maruyama, Koki; Iizuka, Mayumi, et al

Publication Date: Aug 13 ,2021

Journal: Medicine 100(32), pp. e26907

Abstract: RATIONALE: Respiratory muscle paralysis due to low cervical spinal cord injury (CSCI) can lead to dysphagia. Noninvasive positive airway pressure (PAP) therapy can effectively treat this type of dysphagia. High-flow nasal cannula (HFNC) oxygen therapy can generate a low level of positive airway pressure resembling PAP therapy, it may improve the dysphagia. **PATIENT CONCERNS:** The patient was an 87-year-old man without preexisting dysphagia. He suffered a CSCI due to a dislocated C5/6 fracture, without brain injury, and underwent emergency surgery. Postoperatively (day 2), he complained of dysphagia, and the intervention was initiated. **DIAGNOSIS:** Based on clinical findings, dysphagia in this case, may have arisen due to impaired coordination between breathing and swallowing, which typically occurs in patients with CSCI who have reduced forced vital capacity. **INTERVENTIONS:** HFNC oxygen therapy was started immediately after the surgery, and swallowing rehabilitation was started on Day 2. Indirect therapy (without food) and direct therapy (with food) were applied in stages. HFNC oxygen therapy appeared to be effective because swallowing function temporarily decreased when the HFNC oxygen therapy was changed to nasal cannula oxygen therapy. **OUTCOMES:** Swallowing function of the patient improved and he did not develop aspiration pneumonia. **LESSONS:** HFNC oxygen therapy improved swallowing function in a patient with dysphagia associated with respiratory-muscle paralysis following a CSCI. It may have prolonged the apnea tolerance time during swallowing and may have improved the timing of swallowing. HFNC oxygen therapy can facilitate both indirect and direct early swallowing therapy to restore both swallowing and respiratory function.

[Complex C1-2 osteophyte presenting with severe dysphagia and ptosis.](#)

Authors: Alikhani, Puya; Suradi, Yazan; Amin, Sheyar and Amin, Ushtar

Publication Date: 02 18 ,2020

Journal: Neurology 94(7), pp. 324–325

CONFERENCE PROCEEDING

[Implementation of the Frazier Free Water Protocol in Acute Rehabilitation Patients with Oropharyngeal Dysphagia and Its Effect on Patient Perception of Swallowing](#)

Item Type: Conference Proceeding



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Authors: Onusko S.W. and Zakel, M.S.J.

Publication Date: 2022

Publication Details: PM and R. Conference: Annual Assembly of the American Academy of Physical Medicine and Rehabilitation, AAPM and R 2022. Baltimore, MD United States.

14(Supplement 1) (pp S189-S190); John Wiley and Sons Inc.,

Abstract: Objective: To safely implement the Frazier Free Water Protocol (FFWP) in appropriate patients experiencing dysphagia with the aim of improving their self-perception of swallowing and quality of life.

Design(s): Patients were provided with a 10-point abridged version of the validated Swallowing Quality of Life (SWAL-QOL) questionnaire to assess quality of life at time of rehabilitation admission. The FFWP was then implemented throughout their hospital admission. Patients were re-assessed at discharge with the abridged SWAL-QOL (primary outcome). Discharge diet and incidence of aspiration pneumonia (secondary outcomes) were also documented.

Setting(s): Inpatient Rehabilitation Hospital Participants: Inpatient rehabilitation patients with diagnoses of stroke, spinal cord injury, or traumatic brain injury with resulting dysphagia.

Intervention(s): Frazier Free Water Protocol

Main Outcome Measure(s): Primary outcome: Abridged SWAL-QOL.

Secondary Outcomes: discharge diet and incidence of aspiration pneumonia Results: 14 patients were enrolled in the study between July 1st, 2021 and January 1st, 2022. Of those, 7 patients completed both the admission and discharge questionnaire, 6 completed only the admission questionnaire, and 1 was still admitted at the end of the study. All 7 patients who completed the study reported higher scores on the SWAL-QOL assessment, indicating an improvement in perceived quality of life. The mean improvement in SWAL-QOL scores was 13.5 (SD +/- 5.8). Six of the 7 patients were able to tolerate a less restrictive diet at the time of hospital discharge, including 4 patients that were progressed to a regular consistency diet with thin liquids. There were no identified occurrences of aspiration pneumonia while admitted to inpatient rehabilitation in patients enrolled in the study.

Conclusion(s): The implementation and use of the FFWP in patients with dysphagia who are admitted to the acute rehabilitation setting may improve the perceived quality of life of patients while not contributing significantly to the risk of developing aspiration pneumonia.

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DATABASES AND INFORMATION SOURCES USED					
	Pubmed		HMIC		BMJ Best Practice
✓	Medline		Social Policy and Practice	✓	Cochrane Library
	Emcare	✓	CINAHL		TRIP
✓	Embase		PsycINFO		Grey Literature
	AMED		UpToDate	✓	Other – NICE, Google

PURPOSE OF SEARCH			
	Patient info/health & well being	✓	Clinical decision making (inc. patient care)
	Executive Team support		Research/Education/Professional development
	Quality Improvement		Primary Care & Neighbourhoods Directorate support
	KM/Management decision making		Other

USER CATEGORY OF REQUESTOR			
	Medical students		Patients/public
	Nursing/midwifery students		Physician Associates
	Doctor/Psychiatrist		Public Health (Somerset CC)
	Nurses/Midwives		Other
✓	Allied Health professionals		

HAS PERMISSION TO SHARE THE RESULTS BEEN OBTAINED FROM THE REQUESTOR?			
✓	YES - share		NO – do not share





KEY WORDS/SEARCH STRATEGY INCLUDING MESH HEADINGS	LIMITS USED
<p>Ovid Medline search strategy (translated subject terms for other databases)</p> <p>Ovid MEDLINE(R) ALL <1946 to June 04, 2025></p> <p>1 exp Deglutition Disorders/di, rh, th [Diagnosis, Rehabilitation, Therapy] 21387</p> <p>2 ((oral or pharyngeal or oropharyngeal) adj2 (dysphagia or "swallowing difficult*")).mp. [mp=title, book title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms, population supplementary concept word, anatomy supplementary concept word] 2013</p> <p>3 or/1-2 22597</p> <p>4 exp Spinal Injuries/co, rh, th [Complications, Rehabilitation, Therapy] 7511</p> <p>5 exp Spinal Cord Injuries/co, rh, th [Complications, Rehabilitation, Therapy] 25788</p> <p>6 exp Neck Injuries/co, rh, th [Complications, Rehabilitation, Therapy] 2959</p> <p>7 Cervical Cord/in [Injuries] 385</p> <p>8 Osteophyte/co, th [Complications, Therapy] 198</p> <p>9 ((spine or spinal or neck or cervical) adj2 (injur* or fracture*)).mp. [mp=title, book title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms, population supplementary concept word, anatomy supplementary concept word] 120546</p> <p>10 (anterior cervical discectomy and fusion).mp. [mp=title, book title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms, population supplementary concept word, anatomy supplementary concept word] 3737</p> <p>11 or/4-10 127387</p> <p>12 instrumental assessment.mp. 368</p> <p>13 3 and 11 and 12 2</p> <p>14 3 and 11 102</p> <p>15 limit 14 to yr="2020 - 2025" 40</p>	<p>5 years</p>

