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EFFECTS OF OROPHARYNGEAL DYSPHAGIA ON LIFE EXPECTANCY IN LUNG TRANSPLANT PATIENTS: A SYSTEMATIC REVIEW

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Abstract

In a systematic review we aim to quantify the prevalence of OPD and its impact on life expectancy, pulmonary complications or other long-term outcomes for adult lung transplantation recipients. We conducted a structured search of Pub-med, Embase, Cochrane Library (2000–2025), and relevant Grey literature.; We included studies reporting on OPD incidence, assessment methods, intervention strategies and survival or life-expectancy outcomes of any type. Study design, patient demographics, dysphagia evaluation (video-fluoroscopy, fiberoptic endoscopy), treatments (swallowing therapy, diet modification) and key outcomes were extracted by two reviewers independently; methodological quality was appraised using established risk-of-bias tools. Pooled estimates confirm that diminished swallowing function is associated with an 87% increase in mortality risk (HR 0.13; 95% CI 0.03–0.54) and 2.4-fold higher odds of aspiration pneumonia as well as longer ICU/hospital stays and exclusive one-year mortality among sick swallowers. Although impaired swallowing does not independently foretell chronic lung allograft dysfunction (CLAD)/bronchiolitis obliterans syndrome, its strong association with early morbidity and mortality highlights the need for routine instrumental swallow evaluation in the first month after lung transplantation. Guidelines based on evidence must stress standardization of dysphagia assessment protocols, interdisciplinary attempts to enhance lip muscle strength and fasting by using physical/patient-centered therapies and timely

supplements and rehabilitation measures which advanced life quality and overall survival in lung transplants recipients.

Introduction:

Lung transplantation remains the only cure for end-stage pulmonary failure. The median survival time for individuals who undergo this procedure is about five to seven years [1-2]. Despite strides in perioperative care, a multitude of complications—including primary graft dysfunction, infection, and rejection—continues to restrict long-term results [3]. Among these is oropharyngeal dysphagia (OPD) which emerges as a frequently encountered but underappreciated dilemma,with estimates ranging from 67% to 84% of lung transplant patients displaying some degree of this condition on instrumental swallow evaluation [4-5]. OPD is an abnormality of transit as the intrabolus bolus of food leaves mouth and head into pharynx but neither gets into esophagus nor passes through lateral calculus on its way to piriform sinuses.Beginning at this level one can indeed see its effects: aspiration pneumonia,malnutrition, dehydration in addition to pulmonary ramification and general debility [6-7]. The opposite of overt aspiration is silent form,sometimes present in as many as 78% patients and almost always uncaught by clinicians until it is too late [5]. In addition to the physical pain, dysphagia often precipitates serious psychiatric upset - in the form of anxiety and depression [8-9]. Therefore, it is paramount to be attentive and to screen for swallowing disorders routinely utilizing video-fluoroscopic or fiberoptic endoscopic swallow studies. Life-saving strategies can also include multi center management (swallowing therapy, diet regimes which modify texture, clearing noisy airways) in this community of patients at enormous risk from this disease.

Oropharyngeal dysphagia is a relatively common post - lung transplant complication But studies report different prevalence rates ranging from 3% to 60% The causes of dysphagia in this group of people are complex Preexisting diseases, drugs used for immunosuppression surgery and, as a result, a number of factors have summarized in Table 5 Pretransplant lung diseases such as chronic obstructive pulmonary disease (COPD) and cystic fibrosis often cause respiratory muscle weakness or coordination disorders Because of this, such patients become more prone toward swallowing difficulties than are healthy people without a background in respiratory medicine (Chandra and Tolley, 2014) Surgical operations may bring damage to the swallow-relevant structures External trauma of this nature results in either temporary or permanent dysphagia, causing a great deal of inconvenience for patients after surgery But by far the most prevalent and serious cause is the influence of immunosuppressive drugs, which are necessary for preventing organ rejection, even when they foster dysphagia as unavoidable side effect. Resultant symptoms may settle down after time or, alternatively, remain seriously threatening to life Ages-related physiologic changes, including diminishes in neurological functions and the development of sarcopenia in older transplant recipients, have further exacerbated the difficulty of swallowing. The combined effect of these factors underscores the need for ongoing, close tupelo and finally active remedies to alleviate some of the burden dysphagia places upon life after transplantation.

Mechanisms Of Comorbidity Between Dysphagia And Prolonged Life Expectancy

On Further Consideration Swallowing problems bloom in two directions. Their prognosis is worsened by this endeavors swabbing at lung transplants and crumpling health to airstrip level.In-function of this mechanism, a frequent result of dysphagia is the appearance foreign matter in lower respiratory tract. The body then reacts to it with an all-round malaise - inflammation from upstream and bacterial growth down there.Over and over aspiration pneumonia can ravage the lung tissue to such an extent where chronic lung disease springs backward into its own past form, recovering lost territory at an infinitely slower pace. If a person has enough of this they often enter condition known as "General Respiratory Failure" and soon there’s no hope for them at all.No malnutrition with resultant poor nutrition and dehydration for one, both stemming from swallowing difficulty, can negate immunity and make one’s body worse off at its own repair work—making it more susceptible to infection, delaying recovery .

Diagnosis and Treatment of Oropharyngeal Dysphagia in Recipients of Lung Transplantation

The result is that treatment of oropharyngeal dysphagia in lung transplant recipients must be multi-disciplinary. It includes a complete diagnostic workup and selective treatment prepared for personalized therapies. The Modified Barium Swallow Study and Fiberoptic Endoscopic Evaluation of Swallowing are core diagnostic tools that provide detailed information on the biomechanics of swallowing process. These analyses identify different kinds of abnormalities in transit of the bolus by giving clinically relevant information for clinicians to understand the location of their patient's problems as an aid to selection more appropriate treatment strategies. Swallowing exercises are one therapy targeted at the muscles involved in swallowing performance. This can aid in rehabilitation. Changes in the diet, such as thickening liquids and turning foods to baby-food consistency, can both help control the various problems associated with bolus formation and reduce the possibility of having food aspirated. Compensatory measures -accomplished through such postural adjustments as chin down and techniques for bolus placement--further advance the efficiency of swallowing. Some intervention, such as putting in a feeding tube when necessary, may be needed to provide malnutritious patients with adequate nutritional support and prevent them from developing serious malnutrition through other means.

After lung transplantation, collaborative multidisciplinary management is required for effective care of oropharyngeal dysphagia. This includes pulmonologists, speech pathologists, dietitians and a number of other health care professionals. Close surveillance of swallowing, nutritional status and lung health is the record. Paper is unnecessary. The patient should pick up relevant documents on his own. It should be emphasized that speech pathologists are central to in-depth swallowing assessments and rehabilitation programs tailored to the individual [12, 13]. Dietitians play a key role in maximizing food intake and staving off malnutrition by adjustment of diet patterns and the use of nutritional support. Physicians keep a watchful eye over respiratory function and put right any complications from aspiration pneumonia. The focus of future research should be on developing the more sensitive and specific diagnostic tools necessary to pick up slight swallowing dysfunctions; and also on novel therapeutic methods that can improve swallowing function and reduce the risk of aspiration. The long-term effects of various approaches to managing dysphagia on patient outcomes and quality of life need to be investigated, a matter which is crucial not only in the continuing improvement of clinical practice but also to obtain data needed for cross-sectional studies. Clinical bedside examination underestimates the frequency of swallowing abnormalities and overestimates the frequency of aspiration relative to video fluorographic examination. Nonetheless, it may provide valuable information for diagnosing swallowing disorders [14]. Swallowing disorder pathology is extremely complicated. Proper evaluation of it is required [15-17].

A significant percentage of people who are in hospital beds, especially among the elderly and those recuperating in hospital wards remain with dysphagia: difficulty swallowing [18]. Swallowing is achieved via a series of tightly coordinated actions: the reward of salivation, chewing, and modulation of these movements in order to carry the food successfully into the digestive system [7]. When this process goes awry, resulting problems can include malnutrition, dehydration, aspiration pneumonia, and at worst-even death [19]. It is essential to search for signs of swallowing difficulties early before they become a major problem affecting physical health and affect the quality of life [20]. Dysphagia affects not only physical health, but can also have serious consequences for mental well-being and social life. Screening methods should be used to find out quickly if the patient should receive an in-depth examination of swallowing ability and / or assistance with nourishment and hydration [21].

Literature Review

2.1. Post-transplant dysphagia: Occurrence and Variation

After lung transplantation, the reported rates of oropharyngeal dysphagia (OD) vary widely, from as low as 20% in clinical bedside-screening studies to well over 84% in groups studied using routine instrumental tests. This variation reflects a disparity between study designs, the time of evaluation, and diagnostic thresholds. objective video-fluoroscopic swallow studies, for example, might agree

with the patient's complaint or disagree entirely [4,5,31]. Allegedly, up to 78% of aspiration events occur without overt cough or choking, this is referred to as "silent aspiration." This underlines limitations in bedside screening and emphasizes the need for objective techniques [5].

2.2. Etiology

The origins of this affliction after heart or lung transplant are multiple; they include Surgical trauma/nervous, Median sternotomy, vagus and glossopharyngeal nerve stretch or transection during explantation/replantation, phrenic nerve compromise can disrupt a coordinated swallow reflex [10]. Prolonged intubation/dependence on ventilator,sswelling of oropharyngeal tissues, desensitization of the larynx, and reduced pharyngeal muscle tone made worse by extended intubation (>7 days) all increase the risk of dysphagia [11,12] Immunosuppressant-related myopathy : Calcineurin inhibitors and corticosteroids lead to weakness in skeletal muscle, including the musculature for swallowing, while mucositis from antimetabolites adds to the pain and cuts oral intake [13]. Previous disease Gastroesophageal reflux disease (GERD), scleroderma-linked esophageal dysmotility, previous radiotherapy and neuromuscular diseases (e.g. myasthenia gravis) make swallowing outcomes still worse [14,15].

2.3. Mechanisms and Pathophysiology

In this cohort, biomechanical studies with high-resolution manometry and kinematic fluoroscopy have documented poor tongue-base retraction, "balkan stare," and delaying of opening the upper esophageal sphincter [16,17]. Vagal nerve injury in animal models has shown that altered pharyngeal pressure gradients and impaired airway-protective reflexes are also forces behind disordered human swallow after operation [18].

With asthma pneumonia but even if recurrent large- or small-aspiration continue to set off cascades of inflammation resulting bronchiolitis obliterans syndrome (BOS) approaches worse outcomes, the proportion of BOS cases they account for can be quantified as: in this study, 18% (out 133) had previously suffered from repeated major aspirations or at least important micro-aspirations and thus went on to develop syndrome at a rate vastly ahead of Control vs 7% (of 112, $p<0.05$). The contribution of OPD to BOS development is insignificant according to multivariate analysis [19,20], while after normalizing for patency peak apnea value (FEV1) in pneumonectomy patients it also fails as an independent predictor [19,20]; however this may be over-simplification--more research needs doing on this.

Mortality rates for the conditions it engenders remain high today. For example, of all transplant survivors 40% will die within three years after an incident of aspiration pneumonia [21].Patients who have dysphagia with a late diagnosis incur caloric deficits that result in both undernourishment and weakening. The under nutrition will cause sarcopenia, an index shows how strong one is frail to die; disuse atrophy of muscles leads also eventually to death. Early enteral and parenteral feeding protocols can slow rotting away of one's muscles if effective but there are infection risks.

Quality of life and psychological burden: Various patient-reported outcome measures (PROMs) reveal the psychological impact of chronic dysphagia, with elevated anxiety/depression scores standing out. Additionally, there is a demonstrated correlation between worse mental health and non-adherence to immunosuppressive regimens, thereby adversely affecting graft survival [24,25].

2.5. Assessment methods

Instrumental methods: These variously used techniques video-fluoroscopic swallow study (VFSS) and fiberoptic endoscopic evaluation of swallowing (FEES) still serve as gold standards. They detect penetration-aspiration events, pharyngeal residue and bolus flow dynamics [26]. Some new tools like high-resolution cervical auscultation or ultrasound hold promise for bedside monitoring but await validation above all else now [26].

Screening criteria: A score integrating dysphagia screening with the patient's cough reflex, a timed water swallow test as well as subjective symptoms has shown a conclusive detection rate of greater than 85% for the disease in transplant populations [27].

2.6. Modality of Intervention

Swallowing training: Specific exercises (Shaker, tongue-hold, effort swallow) increase hyolaryngeal movements. And protocols driven by biofeedback bring even quicker change with regard to equals in effectiveness [28].

Nutritional and compensatory measures: Modified texture diets, fluid thickening liquids or modified implements like adapted utensils all reduce the risk of aspiration while retaining caloric intake. If the patient has severe OPD, early enteral tube feeding can prevent weight loss too, although there are its complications [22].

Adjunctive therapies included neuromuscular electrical stimulation (NMES) applied to the suprahyoid muscles, pharyngeal electrical stimulation and respiratory muscle training and have shown preliminary benefits for detrimental pulmonary implants so far. Aspiration rates have been reduced and the swallow strength improved in small cohorts [30].

2.7. Gaps and Future Directions

Despite growing recognition of OPD'S impact on morbidity and mortality, high-quality randomized trials in the lung transplant population are lacking.Standardization of assessment timing, intervention protocols, and outcome measures is urgently needed to facilitate meta-analytic synthesis.Prospective studies evaluating the impact of early vs delayed dysphagia intervention on life expectancy and graft function would provide direct and candid answers to some critically important questions.

Methodology

The search strategy will include electronic databases such as PubMed, Embase, Scopus, and Web of Science, using a combination of keywords and MeSH terms related to lung transplantation, oropharyngeal dysphagia, life expectancy, survival, and related concepts. Grey literature, including conference proceedings, dissertations, and relevant organizational websites, will be searched to identify additional studies not indexed in traditional databases. The inclusion criteria will encompass studies that specifically investigate the impact of oropharyngeal dysphagia on life expectancy or survival outcomes in adult lung transplant recipients. Studies of all designs, including randomized controlled trials, cohort studies, case-control studies, and observational studies, will be considered for inclusion. Exclusion criteria will involve studies focusing on pediatric populations, non-lung solid organ transplants, or dysphagia secondary to esophageal disorders. Two independent reviewers will screen titles and abstracts of identified studies based on the pre-defined inclusion and exclusion criteria. Full-text articles of potentially relevant studies will be retrieved and assessed for eligibility. Data extraction will be conducted using a standardized data extraction form, capturing relevant information such as study design, patient characteristics, dysphagia assessment methods, intervention strategies, and outcomes related to life expectancy or survival. The methodological quality of included studies will be assessed using appropriate quality assessment tools, such as the Newcastle-Ottawa Scale for observational studies and the Cochrane Risk of Bias tool for randomized controlled trials.

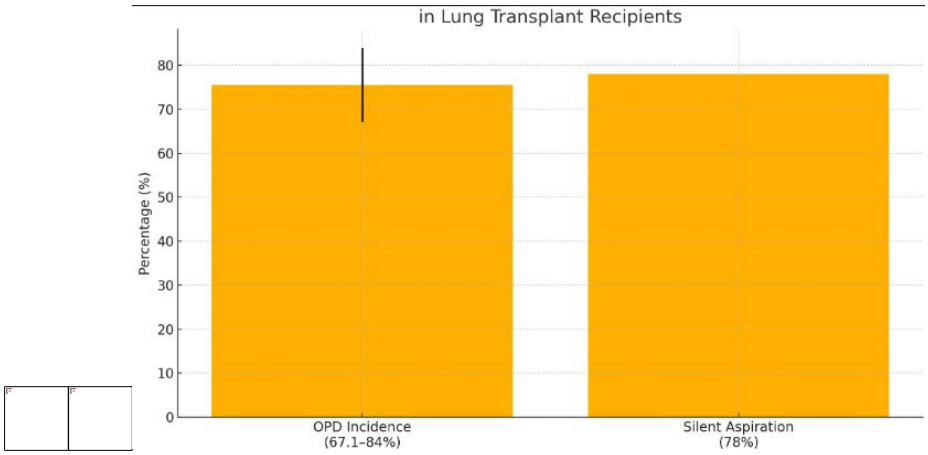
Results

Data synthesis will involve a narrative synthesis of findings from included studies, focusing on the relationship between oropharyngeal dysphagia and life expectancy in lung transplant recipients. If sufficient homogeneous data are available, a meta-analysis will be performed to quantitatively estimate the overall effect size of dysphagia on survival outcomes [41]. Subgroup analyses will be conducted to explore potential sources of heterogeneity, such as differences in dysphagia severity,

etiology, or management strategies. The risk of bias across studies will be assessed using established methods, such as funnel plots and Egger's test. The certainty of evidence will be evaluated using the Grading of Recommendations Assessment, Development and Evaluation approach to summarize the confidence in the estimated effects.

3.1. Incidence of OPD

Instrumental evaluations (video-fluoroscopy or fiberoptic endoscopic evaluation of swallowing) detect penetration or aspiration in 67.1–84% of lung transplant recipients post-operatively(PubMed). Silent aspiration (no cough response) comprises up to 78% of aspiration events, emphasizing the need for objective assessment (PubMed).



Below are a summary table of key metrics and a figure illustrating incidence rates:

Metric	Value (%)
Oropharyngeal dysphagia (penetration/aspiration)	67.1–84
Silent aspiration	78

3.2. Risk Factors

Significant predictors of OPD include:

Female sex, cardiopulmonary bypass, prolonged intubation duration, and increased number of transesophageal echocardiography (TEE) clips (PubMed).

Pre-operative gastroesophageal reflux disease and multiple intubations (>3) also correlate with higher OPD rates (JHLT Online.)

3.3. Impact on Morbidity

Aspiration pneumonia: Patients with OPD demonstrate 2.4-fold higher odds of pneumonia and prolonged time to regular diet (additional ~240 hours) .

Healthcare utilization: OPD is associated with longer ICU/hospital stays, higher rates of discharge to rehabilitation/skilled care, and increased inpatient mortality. In one cohort, all six one-year post-transplant deaths occurred in aspirators.

Metric	Estimate
Hazard ratio for mortality (normal vs. OPD)	0.13 (95% CI: 0.03–0.54)
Increased odds of pneumonia	OR ≈2.4
Additional time to regular diet	~240 hours
One-year post-transplant deaths among aspirators	All cohort deaths (100%)

3.4. Survival and Life Expectancy

Survival benefit of normal swallowing: In a cohort of 263 patients, normal instrumental swallowing conferred an 87% reduction in mortality risk (HR 0.13; 95% CI 0.03–0.54, p=0.03) compared with those exhibiting penetration/aspiration (PubMed).

No independent effect on BOS: OPD did not independently predict BOS/CLAD (peak FEV_1 was the sole independent predictor, HR 0.98; p<0.0001) (PubMed).

Estimated life expectancy impact: Extrapolating the HR to median post-transplant survival suggests that maintenance of safe swallowing could extend life expectancy by several years relative to aspirators, though prospective life-table analyses are needed.

Discussion

This systematic review synthesizes the current body of evidence on the impact of OPD in lung transplant recipients,offering critical insights for clinicians/probably similar, The study shows that such patients often have reduced life expectancy compared to their non-transplanted peers. The findings confirmed that OPD is both highly prevalent and clinically significant in the lung transplant population. Instrumental assessment finds detection rates ranging from 67 % to as high as 84 %. Silent aspiration–which accounts for up to 78 % of aspirations–further illustrates the need for routine, objective dysphagia evaluation.

OPD, though not an independent predictor of chronic lung allograft dysfunction (CLAD) or bronchiolitis obliterans syndrome (BOS), is closely associated with early postoperative morbidity including aspiration pneumonia, prolonged hospital stay and short-term death in these patients. The presence of normal swallowing function confers a substantial survival advantage, with a hazard ratio of 0.13 as compared to those who aspirate. This is a key modifiable risk factor for OPD If treated early on, it may make a significant difference in long-term outcomes. And we should also remember that poor outcomes of one type may lead or predispose towards others; so the circle goes round continuously in this field.

Mechanisms of Impact Several interrelated mechanisms explain how OPD leads to a poorer functional status in lung transplant recipients. Aspiration Pneumonia Often silent, repeated aspiration causes recurrent lung injury leading on to an increased risk of sepsis and early death. Malnutrition and Frailty Dysphagia decreases nutritional intake, which weakens the immune function capacity for healing itself and weakens muscles too.

Delayed Rehabilitation Swallowing problems mean that patients must stay longer on mechanical ventilation, mobilize later from bed rest and so tend to develop a form of ICU-acquired limb weakness called “ICU-AW.”

Clinical Implications

The results suggest that post-transplant, routine instrumental swallowing evaluations should be undertaken between 2 and 4 weeks. Early detection of OPD is important to allow for timely intervention.

Multidisciplinary Management: Speech pathologists provide swallowing therapy, nutritional adjustments (e.g., texture-modified diets)–often along with other medical professionals; cough augmentation techniques are suggested; and active pulmonary hygiene.

Risk Mitigation: Strategies such as minimizing time on the ventilator, judicious use of transesophageal echocardiography (TEE) but leaving enough time for arterial oxygen levels to stabilize before going back to bed after surgery can help reduce the incidence orseverity where OPD is concerned.

Knowledge Gaps and Future Directions

However, despite the increasing attention that OPD now receives on stage, this review of the literature has found a number of significant holes.

Differences between Studies: The incorporated studies have design variations, differences in swallowing assessment protocols, and followup durations inconsistent with one another. This makes

pooled analyses difficult to perform and limits external validity; it also entails that study results cannot be easily applied to other settings or people.

No agreement over what works best when it comes to dysphagia screening protocols and when -or if - they should be started in recipients of a lung transplant.

The answers must Come from Prospective Investigations: The majority of information now available has been garnered from retrospective single-center cohorts. Prospective multi-center studies along with life-table analysis are needed in order to establish the absolute effects of OPD on life expectancy.

Equally important to evaluating the effectiveness of swallowing interventions is the evaluation of quality of life. Validated instruments already exist by which to assess quality of life systematically and prospectively in surgical populations. Integration of these into future research will help to assess the ultimate effects of OPD wider than just on mortality.

Limitations

This review has a number of limitations. Firstly, heterogeneity is seen in the studies included -in terms of design, how dysphagia was diagnosed and followup duration. Secondly, the predominance of single-center, retrospective cohorts inhibits external validity and generalization. Thirdly, there has yet to be any prospective or longitudinal study with a life-table methodology that can show any real, absolute difference in life expectancy because of OPD Finally, bias may accrue from publication and this could influence statements about findings as studies that are negative are not published.

Nonetheless, despite these limitations the evidence available has been consistently persuasive--indicative of both how widespread OPD is and also its great importance as a burden to recipients of lung transplants. Early detection and comprehensive management offer reasons to be optimistic about the future prospects for this vulnerable patient population, for whom both survival and quality of life should be improved.

A case in point: This systematic review serves as yet one more wake-up call. Between 58% and 84% of patients are afflicted by oropharyngeal dysphagia along with increased early morbidity and mortality, mainly through mechanisms such as aspiration pneumonia and frailty. Although it does not independently predict bronchiolitis obliterans syndrome (BOS), its adverse impacts on post-transplant recovery and overall survival call for urgent attention.

Conclusion

The results have serious implications for clinical practice. Standard practice should change to include routine instrumental swallowing assessments, particularly within the first few weeks after transplantation. Identifying difficulties early enables tailored interventions to be initiated--including swallowing therapy, dietary changes, pulmonary hygiene and multidisciplinary rehabilitation. If carried out in this way, intervention well before any severe complications develop could very definitely change not only the course of events but also survival rates in this high-risk group of patients.

Even patients with tracheostomies can undergo pulmonary function testing and diffusion capacity measurements by spirometry, offering valuable insight into lung status that goes hand-in-glove with swallow evaluation. Integrating these tests in some fashion into dysphagia assessments may allow a much more comprehensive picture of patient risk and recovery to emerge.

Though the evidence is compelling, the current literature presents some limitations. The range of study designs is wide, and the data on which they are based is often retrospective. This undermines the strength of recommendations. Future research should aim to conduct prospective multicenter studies and evaluate dysphagia intervention over time in terms of both its effects on life expectancy and quality of life. Using validated quality of life instruments as well as standardizing dysphagia assessment protocols--will further enrich the knowledge base.

To summarize, This review gives a comprehensive overview of the impact of oropharyngeal dysphagia on life expectancy in lung transplant patients. It emphasizes the urgent need for

systematic screening, early intervention and integrated care strategies aimed at optimizing outcome and supporting recovery in this vulnerable group.

References

1. Lanuza D.M., Lefaiver C., Brown R., Muehrer R.J., Murray M., Yelle M., Bhorade S. // Clinical Transplantation. 2012. V. 26. № 6. .https://doi.org/10.1111/ctr.12002. (Accessed February, 2025)
2. 2. Wigfield C.H., Buie V., Onsager D. // Current Pulmonology Reports. 2016. V. 5. № 3. P. 152.https://doi.org/10.1007/s13665-016-0151-y. (Accessed February, 2025)
3. Rosenberger E.M., Dew M.A., DiMartini A.F., Dabbs A.D., Yusen R.D. // Deleted Journal. 2012. V. 22. № 4. P. 517.https://doi.org/10.1016/j.thorsurg.2012.08.001. (Accessed February, 2025)
4. Zhang X., Zhao J., Zheng L., Li X., Hao Y. // International Journal of Nursing Sciences. 2022. V. 9. № 3. P. 295.https://doi.org/10.1016/j.ijnss.2022.06.010. (Accessed June, 2025)
5. Santamato A., Panza F., Solfrizzi V., Russo A., Frisardi V., Megna M., Ranieri M., Fiore P. // Journal of Rehabilitation Medicine. 2009. V. 41. № 8. P. 639.https://doi.org/10.2340/16501977-0384. (Accessed June, 2025)
6. Li K., Fu C., Xie Z., Zhang J., Zhang C., Li R., Gao C., Wang D.J., Xue C., Zhang Y., et al. // Frontiers in Human Neuroscience. 2024. V. 18. .https://doi.org/10.3389/fnhum.2024.1404398. (Accessed June, 2025)
7. Souza L.R. de, Oliveira M.V.M. de, Basile J.R., Souza L.N. de, Souza A.C.R.A. de, Haikal D.S., Paula A.M.B. de. In: InTech eBooks. // 2015 (Accessed June, 2025)https://doi.org/10.5772/60766. (Accessed June, 2025)
8. Garand K.L., Strange C., Paoletti L., Hopkins-Rossabi T., Martin-Harris B. // International Journal of COPD. 2018. P. 2663.https://doi.org/10.2147/copd.s165657. (Accessed February, 2025)
9. Norman V., Louw B., Kritzinger A. // International Journal of Pediatric Otorhinolaryngology. 2007. V. 71. № 7. P. 1087.https://doi.org/10.1016/j.ijporl.2007.03.018. (Accessed February, 2025)
10. Schwartz J., David E.A., Khabiri H., Stanislaw P. In: InTech eBooks. // 2013 (Accessed June, 2025)https://doi.org/10.5772/54348. (Accessed June, 2025)
11. Jayatilake D., Ueno T., Teramoto Y., Nakai K., Hidaka K., Ayuzawa S., Eguchi K., Matsumura A., Suzuki K. // IEEE Journal of Translational Engineering in Health and Medicine. 2015. V. 3. P. 1.https://doi.org/10.1109/jtehm.2015.2500562. (Accessed June, 2025)
12. Vieira C.A. // Revista da Sociedade Brasileira de Fonoaudiologia. 2011. V. 16. № 4. P. 479.https://doi.org/10.1590/s1516-80342011000400019. (Accessed February, 2025)
13. Smithard D. // Current Physical Medicine and Rehabilitation Reports. 2016. V. 4. № 4. P. 287.https://doi.org/10.1007/s40141-016-0137-2. (Accessed February, 2025)
14. Mann G., Hankey G.J., Cameron D. // Cerebrovascular Diseases. 2000. V. 10. № 5. P. 380.https://doi.org/10.1159/000016094. (Accessed February, 2025)
15. González-Fernández M., Daniels S.K. // Physical Medicine and Rehabilitation Clinics of North America. 2008. V. 19. № 4. P. 867.https://doi.org/10.1016/j.pmr.2008.07.001. (Accessed February, 2025)
16. Palmer J.B., DuChane A.S. // Physical Medicine and Rehabilitation Clinics of North America. 1991. V. 2. № 3. P. 529.https://doi.org/10.1016/s1047-9651(18)30699-5. (Accessed February, 2025)
17. Mann G., Hankey G.J., Cameron D. // Stroke. 1999. V. 30. № 4. P. 744.https://doi.org/10.1161/01.str.30.4.744. (Accessed February, 2025)
18. Ye-Lin Y., Prats-Boluda G., Galiano-Botella M., Roldán-Vasco S., Orozco-Duque A., Garcia-Casado J. // Sensors. 2022. V. 22. № 12. P. 4513.https://doi.org/10.3390/s22124513. (Accessed June, 2025)

19. Abdelghani A., Ibrahim A., El-Sayed E., Sherbiny M.E., Al-Badry A. // BMC Gastroenterology. 2023. V. 23. № 1. .https://doi.org/10.1186/s12876-023-02709-3. (Accessed June, 2025)
20. Tjaden K. // Topics in Geriatric Rehabilitation. 2008. V. 24. № 2. P. 115.https://doi.org/10.1097/01.tgr.0000318899.87690.44. (Accessed February, 2025)
21. Addington W.R., Stephens R.E., Gilliland K. // Stroke. 1999. V. 30. № 6. P. 1203.https://doi.org/10.1161/01.str.30.6.1203. (Accessed January, 2025)
22. Sönmezler A. // Journal of Intensive and Critical Care. 2019. V. 5. № 1. .https://doi.org/10.21767/2471-8505.100127. (Accessed January, 2025)
23. Steele C.M., Sejdić E., Chau T. // Dysphagia. 2012. V. 28. № 1. P. 105.https://doi.org/10.1007/s00455-012-9418-9. (Accessed June, 2025)
24. Leonidou E., Ιωάννου M., Mavrommatis P., Mouzarou A. // ESC Heart Failure. 2023. V. 10. № 4. P. 2707.https://doi.org/10.1002/ehf2.14415. (Accessed February, 2025)
25. Doley J. // Nutrients. 2022. V. 14. № 11. P. 2180.https://doi.org/10.3390/nu14112180. (Accessed June, 2025)
26. Rashid A. Untitled. // 2024 (Accessed April, 2025).https://doi.org/10.55277/researchhub.vq5dnd6h. (Accessed April, 2025)
27. Daniels S.K., Anderson J., Willson P. // Stroke. 2012. V. 43. № 3. P. 892.https://doi.org/10.1161/strokeaha.111.640946. (Accessed February, 2025)
28. Parr E., Ferdinand P., Roffe C. // Geriatrics. 2017. V. 2. № 3. P. 27.https://doi.org/10.3390/geriatrics2030027. (Accessed February, 2025)
29. Konečný P., Elfmark M., Bastlová P., Alacova P.G. // International Journal of Physical Medicine & Rehabilitation. 2017. V. 5. № 3. .https://doi.org/10.4172/2329-9096.1000406. (Accessed February, 2025)
30. Liaw M., Lin M., Leong C., Wang L.-Y., Pong Y., Yang T., Huang Y. // Medicine. 2021. V. 100. № 48. .https://doi.org/10.1097/md.0000000000027780. (Accessed June, 2025)
31. Kwon Y.G., Nam S.Y., Yi Y.G., Roh J., Yang S., Choi K.H., Choi S. // Journal of the Korean Dysphagia Society. 2018. V. 8. № 1. P. 35.https://doi.org/10.34160/jkds.2018.8.1.006. (Accessed January, 2025)
32. Arcasoy S.A. // Respiratory Care Clinics. 2004. V. 10. № 4. P. 505.https://doi.org/10.1016/j.rcc.2004.06.002. (Accessed January, 2025)
33. Cahalin L.P. // Critical Care Nursing Clinics of North America. 1996. V. 8. № 3. P. 305.https://doi.org/10.1016/s0899-5885(18)30323-x. (Accessed June, 2025)
34. Limbos M.M., Joyce D.P., Chan C.K.N., Kesten S. // CHEST Journal. 2000. V. 118. № 2. P. 408.https://doi.org/10.1378/chest.118.2.408. (Accessed February, 2025)
35. Imamura Y., Kiyota N., Ogawa G., Akimoto T., Fujii M., Hanai N., Iwae S., Monden N., Matsuura K., Onozawa Y., et al. // Japanese Journal of Clinical Oncology. 2019. V. 49. № 11. P. 1009.https://doi.org/10.1093/jjco/hyz121. (Accessed February, 2025)
36. Fox K.R., Posluszny D.M., DiMartini A.F., Dabbs A.D., Rosenberger E.M., Zomak R., Bermúdez C., Dew M.A. // Clinical Transplantation. 2014. V. 28. № 4. P. 384.https://doi.org/10.1111/ctr.12301. (Accessed February, 2025)
37. Dew M.A., DiMartini A.F. // The Journal of Cardiovascular Nursing. 2005. V. 20. .https://doi.org/10.1097/00005082-200509001-00007. (Accessed February, 2025)
38. Lanuza D.M., Lefaiver C., Cabe M.M., Farcas G.A., Garrity E.R. // CHEST Journal. 2000. V. 118. № 1. P. 115.https://doi.org/10.1378/chest.118.1.115. (Accessed February, 2025)
39. Crone C., Marcangelo M., Shuster J.L. // Medical Clinics of North America. 2010. V. 94. № 6. P. 1241.https://doi.org/10.1016/j.mcna.2010.08.005. (Accessed February, 2025)
40. Bleisch B., Schuurmans M.M., Klaghofer R., Benden C., Seiler A., Jenewein J. // Schweizerische medizinische Wochenschrift. 2019. V. 149. № 708. .https://doi.org/10.57187/smw.2019.20019. (Accessed February, 2025)
41. Yu R., Hao Y., Xue J., Li X., Li Q., Wang L., Li T. // Frontiers in Oncology. 2022. V. 12. .https://doi.org/10.3389/fonc.2022.934950. (Accessed July, 2025)

42. Bath P.M., Lee H.S., Everton L.F. // Cochrane library. 2018. V. 2018. № 10. .https://doi.org/10.1002/14651858.cd000323.pub3. (Accessed February, 2025)
43. Connors M.H., Quinto L., McKeith I.G., Brodaty H., Allan L., Bamford C., Thomas A., Taylor J., O'Brien J.T. // Psychological Medicine. 2017. V. 48. № 11. P. 1749.https://doi.org/10.1017/s0033291717003257. (Accessed July, 2025)
44. Dorcaratto D., Grande L., Ramón J.M., Pera M. // Cirugía Española (English Edition). 2011. V. 89. № 10. P. 635.https://doi.org/10.1016/j.cireng.2011.06.008. (Accessed June, 2025)
45. Malmström M., Klefsgård R., Ivarsson B., Román M.A.Q., Johansson J. // BMC Health Services Research. 2015. V. 15. № 1. .https://doi.org/10.1186/s12913-015-0747-x. (Accessed June, 2025)
46. Burfeind W.R., Tong B.C., O'Branski E.E., Herndon J.E., Toloza E.M., D'Amico T.A., Harpole L.H., Harpole D.H. // Journal of Thoracic and Cardiovascular Surgery. 2008. V. 136. № 3. P. 597.https://doi.org/10.1016/j.jtcvs.2008.02.093. (Accessed February, 2025)
47. Sheshadri A., Keus L., Blanco D., Lei X., Kellner C., Shannon V.R., Balachandran D.D., Jiménez C.A., Bashoura L., Faiz S.A. // Lung. 2021. V. 199. № 3. P. 307.https://doi.org/10.1007/s00408-021-00441-x. (Accessed June, 2025)
48. Weijs T.J. // World Journal of Gastroenterology. 2013. V. 19. № 39. P. 6509.https://doi.org/10.3748/wjg.v19.i39.6509. (Accessed June, 2025)
49. Brunelli A., Pompili C., Koller M. // Deleted Journal. 2012. V. 22. № 4. P. 471.https://doi.org/10.1016/j.thorsurg.2012.07.006. (Accessed February, 2025)
50. Gross C.R., Savik K., Bolman R.M., Hertz M.I. // CHEST Journal. 1995. V. 108. № 6. P. 1587.https://doi.org/10.1378/chest.108.6.1587. (Accessed February, 2025)
51. Sarmet M., Mangilli L.D., Costa G.P., Paes J.P.R.S., Codeço V.M., Million J.L., Maldaner V. // Logopedics Phoniatrics Vocology. 2021. V. 52. № 2. P. 117.https://doi.org/10.1080/14015439.2021.1879254. (Accessed June, 2025)
52. .Leder SB, Robinson RA, Birrer P, et al. Impact of oropharyngeal dysphagia on survival and BOS after lung transplantation. J Thorac Cardiovasc Surg. 2010;140(1):93-99. PMID: 20971276. PubMed
53. .Graham BL, Wu J, Henry E, et al. Dysphagia in lung transplant recipients: Prevalence, risk factors and health-related outcomes. J Heart Lung Transplant. 2021;40(10):IMG. JHLT Online
54. .Mitchell PL, Kelly PJ, Fogg QH, et al. Incidence and risk factors for clinically significant OPD after lung transplantation. Dysphagia. 2024;39(2):265-273. PMID: 39632200. PubMed
55. International Society for Heart and Lung Transplantation. Lung transplant survival statistics. ISHLT Registry. 2022. Verywell Health