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Review

A Conceptual Model of Dysphagia in Older Adults

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Abstract

A conceptual model was developed to create a basis for understanding the risk factors and outcomes associated with dysphagia and to hypothesize the nature of the relationship between certain factors. The conceptual model was developed by two academic speech-language pathologists with ≥10 years research and clinical experience in swallowing and dysphagia in older adults. A comprehensive review of English-language literature was conducted, and relevant, evidence-informed factors associated with dysphagia in older adults were identified. The synthesis of clinical expertise and theoretical underpinnings complemented the literature review, incorporating the socio-ecological model. Discussion and brainstorming of the identified factors and their potential and/or proven relationships with dysphagia were conducted. All the factors identified were initially organized using a thematic approach, then were further structured into overarching categories, guided by the inherent relationships between the factors. The arrangement of the conceptual model framework was undertaken once these categories had been optimized, and consensus had been achieved among the authors with support from the literature. Factors were identified to increase the risk of dysphagia, be an outcome of dysphagia, or both. The conceptual model

illustrates the complex multifactorial relationship between dysphagia and individual, relationship, community, and societal factors. The proposed conceptual model improves our understanding of the risk factors and outcomes associated with dysphagia in older adults. Future work should focus on empirically testing the relationships among the factors presented, so the model can ultimately be used by members of the dysphagia community to target modifiable risk factors for dysphagia, as well as identify effective treatments that optimize overall patient well-being.

Keywords
Conceptual model; older adult; dysphagia; socio-ecological model

1. Introduction

Swallowing is a fundamental component of eating and drinking and is the process by which saliva, food, drink and medications are safely and efficiently transported from the mouth to the stomach. Swallowing requires the successful integration and efficient working of over 50 pairs of muscles, in addition to multiple body systems, in the context of an environment that is conducive to health and wellness (i.e., a safe place to live, food security, access to health care) [1, 2]. Older adults may experience age-related muscular changes (e.g., pharyngeal muscle atrophy) [3], changes to body systems (e.g., neurodegenerative disease), as well as changes to their environment (e.g., transitioning to long-term care due to a decline in health) [4] that may negatively impact swallowing function, resulting in swallowing impairment or dysphagia. Dysphagia may increase the risk of developing adverse health outcomes such as aspiration pneumonia, dehydration [5, 6] and malnutrition [7, 8]. Dysphagia is also associated with choking and asphyxiation [9]. Furthermore, dysphagia is associated with adverse psychosocial outcomes such as anxiety or panic during mealtimes, and caregiver burnout [10-12].

Dysphagia in adults, and even more so in older adults, is complex. Older adults experiencing dysphagia have unique and multifaceted health and social needs. Conceptual models are required to easily illustrate the complex multifactorial relationships between dysphagia and a plethora of risk factors and outcomes. A conceptual model is a diagram of proposed causal linkages among a set of factors that can be used to summarize and integrate complex knowledge, define concepts, provide explanations for causal linkages, and generate hypotheses [13]. Historically, studies have focused on a small number of factors that impact and are influenced by dysphagia. Further, the factors tended to be intrapersonal or those primarily associated with the patients themselves. For example, factors such as advanced age, history of clinical disease, and physical frailty have previously been found to be associated with dysphagia in community dwelling older adults and have been included in conceptual models [14, 15]. More recently, and with the inclusion of larger cohort studies in the literature, there is a better appreciation of the complex and multifactorial nature of dysphagia and as a result, individual, relationship, community, and societal factors are thought to impact/be influenced by dysphagia [16-18]. The socio-ecological framework allows for the organization of potential risk factors and outcomes to provide a more comprehensive, whole-picture appreciation of the complexity of dysphagia in older adults. Therefore, to create a basis for understanding the

risk factors leading to dysphagia and the outcomes resulting from dysphagia, and to hypothesize the nature of the relationship between certain factors specific to the unique health and social needs of olders adults, the purpose of this paper is to propose a conceptual model, drawing upon a socio-ecological framework, that was developed through literature review and clinical experience.

2. Methods

Guided by processes outlined by Earp and Ennett [13], as well as Rimer and Glanz [19], the conceptual model was developed by two academic speech-language pathologists with ≥10 years research and clinical experience in swallowing and dysphagia in older adults. Ethics approval was not required. A comprehensive and exhaustive review of English-language literature was conducted, and relevant factors associated with dysphagia in older adults were identified. Given the diverse medical etiologies encountered within the older adult population, a wide-ranging approach was embraced. The synthesis of clinical expertise and theoretical underpinnings complemented the literature review, incorporating the socio-ecological model to conceptualize how dysphagia might impact and, in turn, be impacted by individual, relationship, community, and societal factors [20]. Individual-level factors pertain to the individual characteristics, as well as knowledge, attitudes, and beliefs and self-efficacy of an individual. Relationship-level factors refer to the influence of individuals within their social network. Community-level factors include the various settings in which participants live and work. Finally, policy-level factors focus on the national, state, and local laws that influence an individual's behavior.

Discussion and brainstorming of the identified factors and their potential relationships with dysphagia was conducted from March to May 2021, which was followed by development of the conceptual model. All the factors identified were organized using a thematic approach. Initially, interrelated factors were grouped into clusters, which, in turn, were further structured into overarching categories, guided by the inherent relationships between the factors, both within and across clusters. The arrangement of the conceptual model was undertaken once these categories had been optimized, and consensus had been achieved among the authors. Factors were omitted only in instances of agreement, and further discussion prompted revisions and iterations of the conceptual model until a unanimous consensus was reached. Any conflicts of opinion between the two authors was resolved through discussion to consensus. In this paper, we present the final version of the conceptual model and an explanation of the factors and why each was included (Figure 1).

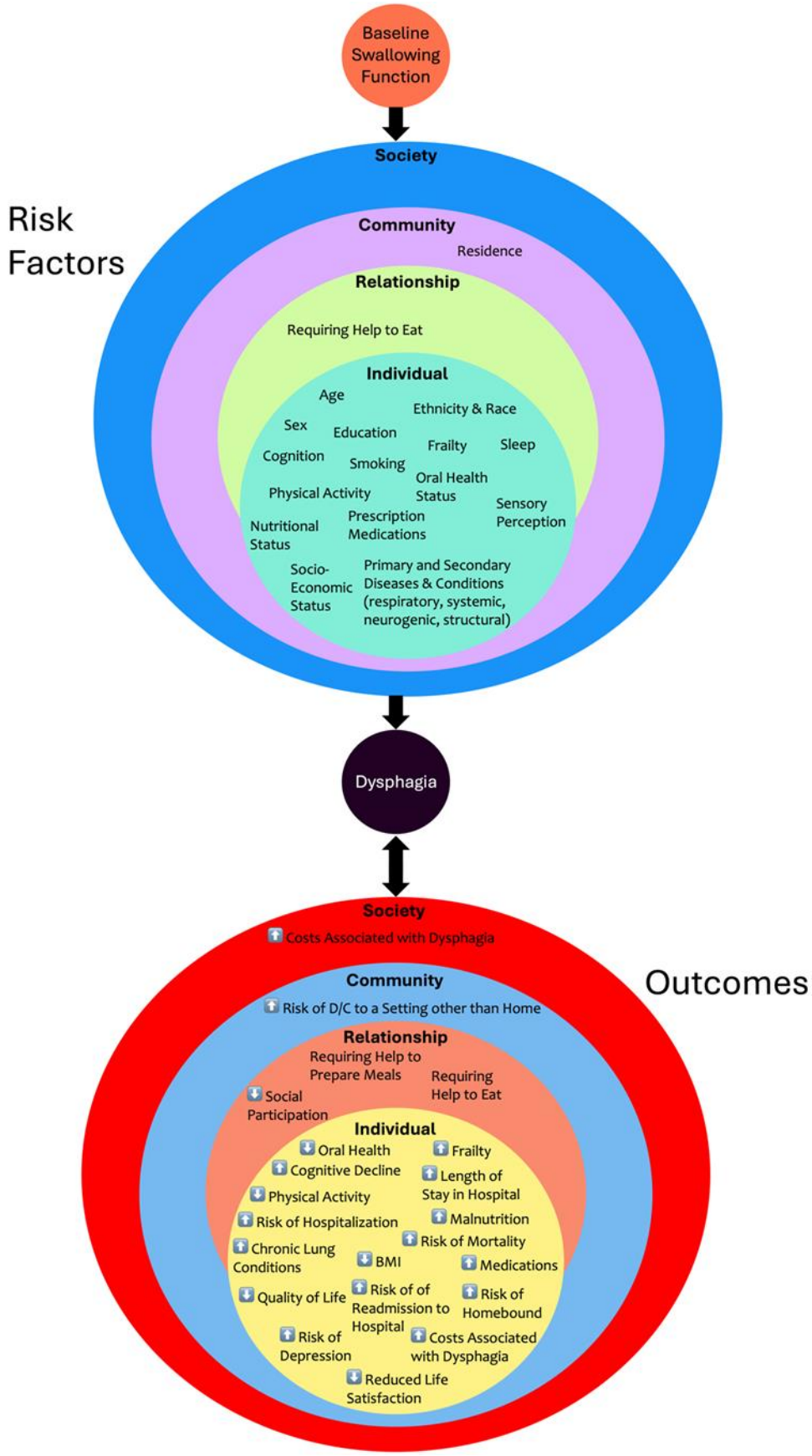

Figure 1 A conceptual model of dysphagia in older adults.

3. Results

3.1 Risk Factors

The following variables were identified as increasing the risk of developing dysphagia. Each variable has been labelled according to the levels of the socio-ecological model (individual, relationship, community, society).

3.1.1 Age (Individual)

The prevalence of dysphagia increases with advancing age, likely related, in part, to the fact that dysphagia is a component of diseases that are more prevalent with increasing age [16]. Furthermore, there are age-related changes to swallowing-related anatomy and physiology that may increase an older person's risk of developing dysphagia [21-23].

3.1.2 Sex (Individual)

Given that dysphagia is a component/results from many other disease and injury processes, the sex distribution tends to be similar to the sex distribution associated with that particular disease. In some cohort and database studies exploring dysphagia of heterogenous etiology, sex distribution has been reported to be relatively equal [24, 25]. In other studies sex distribution has been reported to be unequal [15, 16]. The inequality of sex distribution may be due to the influence of intersectional factors (such as race, ethnicity, and socioeconomic status), which could increase the risk of dysphagia. Intersectionality of the social determinants of health is a lens that can be used to guide research to focus on power dynamics, specifically the relationships between oppression and privilege that are intrinsic to societal practices. This is greatly needed in dysphagia research as no studies currently employ an intersectional lens.

3.1.3 Ethnicity and Race (Individual)

A systematic review summarized findings from research articles that investigated dysphagia using administrative or clinical registry data [26]. Key findings from that work include data pertaining to race and ethnicity. Higher risk of dysphagia following stroke and cervical spinal surgery was observed for Asian and African American people as compared to White people. Aspiration pneumonia is also more common in Asian people as compared to White people. Finally, gastrostomy tube insertion rates after stroke are much higher in African American people as compared to White people. Similarly, an analysis of data collected as part of the Canadian Longitudinal Study on Aging (CLSA) found white race to be associated with a decreased risk of self-reported dysphagia in adults 45 years and older [16]. Findings from cross-sectional analysis of the 2012 National Health Interview Survey highlight that Black, Hispanic, and other racial and ethnic minorities were less likely to report swallowing problems [27]. These findings may be related to increased risk of certain diseases within specific ethnicities, but they also may point to systemic racism biasing how healthcare is delivered.

3.1.4 Education (Individual)

The relationship between education and dysphagia is not well studied, however, associations between low education level and low levels of health literacy and dysphagia in older adults in South Korea and China, respectively, have been identified [28, 29]. Health literacy influences a person's ability to process health information and make health-related decisions [30]. Education impacts employment, financial security, social success, and lifestyle choices, which ultimately influences health in a myriad of ways [31].

3.1.5 Socioeconomic Status (Individual)

The relationship between socioeconomic status and dysphagia is also not well studied. Findings from a small number of studies indicate that having a lower income and having a lack of access to basic needs such as food, shelter, clothing, health and education can all increase risk of dysphagia [27, 32]. Socioeconomic status can also influence care seeking behaviours, as well as the type of care individuals receive [33, 34]. It is likely, although not well documented, that dysphagia has negative financial implications given the costs associated with food and fluid modification, enteral feeding, and formal caregiving.

3.1.6 Residence (Community)

People with dysphagia are more likely to be homebound [35]. Moreover, transportation has been identified as a barrier to accessing care [27].

3.1.7 Oral Health Status (Individual)

Oral health, which has been defined as "a state of being free of mouth and facial pain, oral and throat cancer, oral infection and sores, birth defects such as cleft lip and palate, periodontal disease, tooth decay and tooth loss, and other disease and disorders that limit an individual's capacity in biting, chewing, smiling, speaking, and psychological wellbeing" [36], has been shown to contribute to dysphagia in a variety of ways. Multiple aspects of oral health have been found to be associated with dysphagia including xerostomia/hyposalivation, oral motor skill impairment, reduced maximum tongue strength, missing teeth, reduced maximum occlusal force, and the presence of dentures [37, 38]. Although much of the evidence is cross-sectional, two longitudinal studies show that aspects of poor oral health, such as tooth loss and poor self-reported oral health status, increase risk of dysphagia in community-dwelling older adults [16, 39].

3.1.8 Frailty (Individual)

Frailty is common among older adults [40], and is associated with negative sequelae, including an inability to live well and age in place [41-43]. Despite the growing awareness of the need to identify and manage frailty in older people, there is no single accepted definition. Frailty is often referred to as a syndrome or a broadly defined state [44, 45] Potential relationships between dysphagia and physical frailty (frailty defined as a syndrome) have been explored and the results from cross-sectional studies suggest that the presence of dysphagia is significantly associated with greater odds of frailty [46]. Cross-sectional data also show that tongue strength and occlusal force

is lower in individuals with frailty than in those without frailty [47]. Findings from longitudinal studies provide some conflicting evidence regarding causation. One longitudinal study suggests that frailty defined as a state increases the risk of developing dysphagia, and another longitudinal study provides evidence that dysphagia increases risk of developing physical frailty [16, 48]. It is important to note that dysphagia in these studies is typically measured using patient self-report, symptom severity questionnaires, or with clinical measures (such as a water swallow challenge). Studies that visualize swallowing using instrumental measures such as VFSS are critically lacking.

3.1.9 Number of Medications (Individual)

In patients with dysphagia, tablets are often crushed and capsules are sometimes opened, frequently without sufficient knowledge about the associated changes in medication bioavailability and potential side-effects. That is why medication errors are over three times more common in patients with dysphagia compared to patients with no swallowing difficulties [49]. In an analysis of the permanent medication of 966 geriatric patients with and without oropharyngeal dysphagia, no single type of medication could be identified as a risk factor for dysphagia in the multivariate analysis [50]. Nevertheless, there are multiple case reports and two systematic reviews that identified first and second-generation neuroleptics as a possible cause for dysphagia (e.g., clozapine, olanzapine [51, 52]) likely due to the pharmacological effect on the extrapyramidal system and the resulting impact on the small cervical muscles involved in swallowing. Additionally, polypharmacy is a risk factor for developing aspiration pneumonia [53].

3.1.10 Cognition (Individual)

Multiple cortical and subcortical areas are involved in successful eating and swallowing [54-57]. Cognitive impairment is often caused by cortical and subcortical injury or disease; therefore, it is likely that individuals experiencing cognitive impairment may be at increased risk of experiencing dysphagia. Furthermore, cognitive skills like attention are required during mealtimes. The association between cognitive impairment and dysphagia has been reported in several studies [58-61] and that relationship may be bidirectional as impaired mastication has been linked with cognitive decline [62-64].

3.1.11 Nutritional Status and BMI (Individual)

While nutritional risk and low BMI are known outcomes of dysphagia [65, 66], they may also contribute to its development, though the exact mechanism is currently unclear. One proposed pathway is through muscle wasting or sarcopenia. Malnutrition is an independent risk factor for acute muscle wasting in older, frail, hospitalized patients and muscle atrophy is known to be associated with lower oral intake [67, 68]. Tongue pressure has been found to be reduced in individuals with sarcopenia, but the association between sarcopenia and dysphagia remains inconclusive [47].

3.1.12 Physical Activity (Individual)

Reduced physical activity can lead to sarcopenia, which is a risk factor for dysphagia [69]; however, there is a paucity of evidence exploring the relationship between physical activity and

dysphagia. A recent cross-sectional study identified no association between daily physical activity and dysphagia risk in community-dwelling older adults; however, a greater amount of leisure-time exercise was associated with lower dysphagia risk [70]. Further, individuals in the highest leisure-time exercise quartile were significantly less likely to present with dysphagia as compared to those with the lowest leisure-time exercise [70].

3.1.13 Sensory Perception (Individual)

The ability to perceive the sensory qualities of food and drink through taste and smell diminishes with advanced age, increasing the risk of developing dysphagia [71].

3.1.14 Sleep (Individual)

There is emerging evidence supporting the importance of sleep to improve and support motor learning [72]. This suggests that sleep could play an important role in swallow rehabilitation.

3.1.15 Smoking (Individual)

Cigarette smoke had been found to adversely impact the pharyngoglottal closure reflex which could increase risk of aspiration [73]. Additionally, smoking may potentially alter the coordination between respiration and swallowing, negatively impacting the sensory aspects of eating and swallowing. This may result in altered motor aspects of eating and swallowing. Furthermore, smoking is a risk factor for developing aspiration pneumonia [53].

3.1.16 Requiring Help to Eat (Relationship)

Dysphagia has been found to be associated with capacity to perform activities of daily living, such as eating [74, 75]. This may be due to the fact that requiring assistance to eat can have a negative impact on the sensory aspects of eating and swallowing, resulting in potentially altered motor aspects of eating and swallowing. Additionally, there is evidence to suggest that requiring help to eat is associated with increased risk for aspiration pneumonia [53].

3.1.17 Diseases and Conditions that Cause Dysphagia (Individual)

As mentioned earlier, dysphagia is a common component of many diseases and conditions including respiratory diseases and conditions, neurogenic diseases and conditions, and structural diseases and conditions [76].

The oropharynx is a shared pathway that supports ventilation as well as nutrition and hydration; therefore, disease that impacts the ventilatory system may also impact the process of deglutition [77, 78]. For example, there is evidence to suggest that older adults with respiratory impairment such as pneumonia, chronic obstructive pulmonary disease (COPD), or obstructive sleep apnea (OSA) may experience dysphagia [79-81]. Chronic lung conditions may also be a consequence, or worsened by, the existence of dysphagia. In individuals with COPD, dysphagia and prandial aspiration is associated with severe acute exacerbations of COPD [82, 83], and the development of respiratory complications such as aspiration pneumonia can further exacerbate existing respiratory disease [84].

Many neurogenic diseases and conditions contribute to the development of dysphagia [85], including conditions such as dementia, multiple sclerosis, Parkinson disease, and delirium to name a few. The prevalence of dysphagia in people with dementia may be as high as 93% [86], but varies depending on the type of dementia, how the dysphagia is identified, and when in the disease process the evaluation occurs [87, 88]. Dysphagia is estimated to impact up to 43% of people with multiple sclerosis [89-91]. Moreover, more than 80% of people with Parkinson disease develop dysphagia over the course of the disease [76]. While subtle swallowing changes may take place in the earlier stages of the disease, dysphagia may not be identified until later stages [76, 92, 93]. Furthermore, delirium appears to cause dysphagia in older adults with and without dementia [94, 95].

Dysphagia may also result from structural conditions affecting the head and neck. Dysphagia impacts as many as 45% of people with head and neck cancer and can be caused by the tumor itself, or as a side effect of treatment [96].

3.2 Outcomes

The following variables were identified to be potential outcomes of dysphagia. Each variable has also been labelled according to the levels of the socio-ecological model (individual, relationship, community, society).

3.2.1 Reduced Oral Health (Individual)

Older patients with dysphagia demonstrate poorer oral health (including factors such as full edentulism, dental caries, gingivitis, and periodontitis) than those without dysphagia [97]. In a study of 459 patients with dysphagia in an acute care setting in Japan, the authors reported that approximately 70% of participants had increased tongue coating, which they suggested is indicative of declining tongue function [98]. Finally, a recent study revealed that, while poor oral health and dysphagia were both independently associated with mortality risk, patients with both poor oral health and dysphagia showed the highest mortality risk (2.6 times higher than those without either impairment) [99].

3.2.2 Increased Frailty (Individual)

One longitudinal study provides evidence that dysphagia increases the risk of developing physical frailty (defined as a syndrome) [48].

3.2.3 Increased Number of Medications (Individual)

Older adults with complex health conditions, including dysphagia, require a large number of prescription medications [100, 101].

3.2.4 Cognitive Decline (Individual)

Impaired mastication has been linked with cognitive decline [62-64].

3.2.5 Malnutrition and Reduced BMI (Individual)

Nutritional risk and low BMI is most commonly considered to be a negative consequence of dysphagia [65, 66].

3.2.6 Reduced Physical Activity (Individual)

While there is a paucity of evidence exploring the relationship between physical activity and dysphagia, evidence suggests that nutritional status and physical activity levels are significantly associated in older adults [102]. Therefore, it is hypothesized that the negative impact of dysphagia on nutritional status may also negatively impact levels of physical activity.

3.2.7 Increased Risk of Hospitalization (Individual)

Patients with dysphagia have an increased risk of needing to be hospitalized. In an observational study of 178 older adults receiving home care, worse dysphagia was significantly associated with unplanned hospitalization [103].

3.2.8 Increased Length of Stay in Hospital (Individual)

Patients with dysphagia have significantly longer length of stay in hospital as compared with patients without dysphagia [24, 104, 105].

3.2.9 Increased Risk of Readmission to Hospital (Individual)

Dysphagia is significant risk factor for hospital readmission [106].

3.2.10 Increased Risk of Being Discharged to a Setting other than Home (Individual)

There is evidence that demonstrates that dysphagia leads to difficulties returning home after an acute admission to hospital [24]. This may be related to several factors such as the ability to maintain proper nutrition and the support needed from formal or informal caregivers.

3.2.11 Increased Risk of Mortality (Individual)

Dysphagia is associated with increased risk of mortality [107-109].

3.2.12 Reduced Quality of Life (Individual)

Dysphagia has been found to negatively impact quality of life and is associated with significantly increased anxiety and a significantly decreased sense of well-being [110-112].

3.2.13 Reduced Life Satisfaction (Individual)

As mentioned above, dysphagia is associated with negative psychosocial consequences that adversely impact a person's well-being and quality of life [10, 113]. Experiencing oropharyngeal dysphagia may lead to an increased sense of isolation and loss of self-esteem, avoidance of social eating situations, anxiety or panic during mealtimes, and caregiver burnout [11, 111].

3.2.14 Increased Risk of Depression (Individual)

In a sample of 96 patients with dysphagia, 47.3% were found to have clinically relevant symptoms of anxiety, depression, or both anxiety and depression [114].

3.2.15 Requiring Help to Prepare Meals (Relationship)

Often individuals with dysphagia require food and/or fluid modification as part of their management plan. Caregivers frequently report that they have to help care recipients prepare meals with adequate rheological and nutritional characteristics [12, 74, 115].

3.2.16 Requiring Help to Eat (Relationship)

Requiring assistance to eat can have a negative impact on the sensory aspects of eating and swallowing resulting in potentially altered motor aspects of eating and swallowing. Additionally, there is evidence to suggest that requiring help to eat is associated with increased risk for aspiration pneumonia [53].

3.2.17 Reduced Social Participation (Relationship)

Dysphagia often results in the need for complex management plans that may act as a barrier to being able to participate in social activities involving food and drink [111, 116].

3.2.18 Increased Risk of Being Homebound (Individual)

Older adults experiencing dysphagia had higher odds of being homebound [35].

3.2.19 Increased Costs Associated with Dysphagia (Individual/Society)

There is preliminary evidence that dysphagia has negative financial implications given the costs associated with food and fluid modification, enteral feeding, days lost from work, and formal and informal caregiving. Findings from a cross-sectional analysis of the 2012 National Health Interview Survey highlight that respondents with a swallowing problem reported 11.6 ± 2.0 lost workdays in the past year versus 3.4 ± 0.1 lost workdays for those without a swallowing problem [117]. Furthermore, a study of dysphagia in head and neck cancer patients identified that out-of-pocket expenses were higher than those reported for adult patients with other solid tumours and lost time from work was similar to time lost by breast cancer patients [118]. Finally, an association has been found between dysphagia and food insecurity [35].

4. Discussion

In this paper, we have proposed a model of factors that have been suggested to increase the risk of dysphagia or have been identified as outcomes of dysphagia, drawing upon a socioecological framework. Our model is firmly rooted in theoretical foundation, enriched by insights gleaned from the extensive body of literature on dysphagia, and supplemented by clinical expertise. Table S1 provides a summary of all the included factors in addition to findings from selected studies.

It is essential to acknowledge that this conceptual model is not set in stone; rather, it serves as a robust foundation upon which future research endeavors can build. The landscape of dysphagia studies is evolving, with a noticeable departure from the conventional medical model. We are now embracing a biopsychosocial perspective, firmly nested within a social-ecological framework. This perspective allows us to look at the interconnection between biology, psychology, and socio-environmental factors while acknowledging that swallowing is not just necessary for maintaining optimal nutrition and hydration, but it is also a critical component of many aspects of social life and for participating in community and societal events. For example, holidays, religious and cultural events, and social gatherings often include food and drink. This paradigm shift empowers clinicians and researchers alike to consider the intricate interplay among individual, relational, community, and societal factors. Given this newer approach, numerous variables within our proposed model have yet to be fully explored, and their relationship to dysphagia has yet to be extensively scrutinized or quantified. Consequently, our model aids in comprehending the spectrum of factors that either increase an individual's vulnerability to dysphagia or offer protective mechanisms against it. Furthermore, it sheds light on the repercussions associated with dysphagia.

One of the advantages of employing a visual model to encapsulate these intricate factors is its ability to portray a dynamic and ongoing process. These models are intended to be adaptable, readily reshaped as new empirical evidence emerges and standards of patient care evolve. Factors may be subject to inclusion, modification, omission, or reinforcement as research in this domain continues to expand and refine our understanding.

4.1 Future Directions

Using the socioecological framework to develop this conceptual model highlights that previous research has overwhelmingly focused on factors related to the individual, but it is critical that future research and iterations of the conceptual model explore and identify important factors at the relationship, community and societal levels, such as how culture may play a role in the experience of dysphagia. For example, in some cultures having dysphagia may cause social isolation and depression given the negative views associated with the condition. Such health beliefs have yet to be considered within the current literature in the context of dysphagia. It is also important to consider how culture may impact the caregiver experience. Research currently suggests that in cultures where caring for an aging parent is considered a familial expectation, family caregivers often experience a sense of pride and honour in fulfilling this role [119, 120]. However, this may not be the experience for all caregivers so a greater understand of the impacts of culture on dysphagia is required.

Further research is also required to understand how the conceptual model can support our understanding of dysphagia in the broader consideration of health and wellness of older adults. However, as mentioned previously, this will require carefully designed studies that examine the interrelationships outlined in our model and more general measures of wellbeing. Similarly, such studies could assist in determining what factors may be central to preventing dysphagia.

5. Conclusions

This conceptual model of dysphagia in older adults can function as a framework for organizing, defining, and categorizing the factors influencing how dysphagia is acquired, how it might be

prevented, and the biopsychosocial impacts of dysphagia. Rooted in established theories, shaped by clinical expertise and consensus, and drawing upon a socioecological framework, this model requires ongoing scientific validation and refinement as new evidence emerges. The overarching goal of the model is to serve as a framework to develop hypothesis-driven research pertaining to dysphagia in older adults. Although preliminary, the model is intended to serve as an initial reference point, aiding the dysphagia community in recognizing risk factors leading to dysphagia and the outcomes of the condition. By using data-driven and well-designed studies to empirically test the relationships among the factors presented in our conceptual model, it can be further refined to allow the dysphagia community to identify both methods to prevent dysphagia but also effective treatments that optimize overall well-being.

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Author Contributions

Rebecca H. Affoo: Conceptualization, methodology, project administration, writing – original draft, review and editing. Ashwini Namasivayam-MacDonald: Conceptualization, methodology, writing – original draft, review and editing.

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Competing Interests

The authors have declared that no competing interests exist.

Additional Materials

The following additional materials are uploaded at the page of this paper.

1. Table S1: Factors Included in the Conceptual Model and Selected Supporting Studies.

References

1. Doty RW, Bosma JF. An electromyographic analysis of reflex deglutition. J Neurophysiol. 1956; 19: 44-60.
2. Jean A. Brainstem organization of the swallowing network. Brain Behav Evol. 1984; 25: 109-116.
3. Molfenter SM, Lenell C, Lazarus CL. Volumetric changes to the pharynx in healthy aging: Consequence for pharyngeal swallow mechanics and function. Dysphagia. 2019; 34: 129-137.
4. Sullivan GJ, Williams C. Older adult transitions into long-term care: A meta-synthesis. J Gerontol Nurs. 2017; 43: 41-49.

5. Crary MA, Humphrey JL, Carnaby-Mann G, Sambandam R, Miller L, Silliman S. Dysphagia, nutrition, and hydration in ischemic stroke patients at admission and discharge from acute care. Dysphagia. 2013; 28: 69-76.
6. Whelan K. Inadequate fluid intakes in dysphagic acute stroke. Clin Nutr. 2001; 20: 423-428.
7. Namasivayam-MacDonald AM, Slaughter SE, Morrison J, Steele CM, Carrier N, Lengyel C, et al. Inadequate fluid intake in long term care residents: Prevalence and determinants. Geriatr Nurs. 2018; 39: 330-335.
8. Takeuchi K, Aida J, Ito K, Furuta M, Yamashita Y, Osaka K. Nutritional status and dysphagia risk among community-dwelling frail older adults. J Nutr Health Aging. 2014; 18: 352-357.
9. Feinberg MJ, Ekberg O. Deglutition after near-fatal choking episode: Radiologic evaluation. Radiology. 1990; 176: 637-640.
10. Chen PH, Golub JS, Hapner ER, Johns MM. Prevalence of perceived dysphagia and quality-of-life impairment in a geriatric population. Dysphagia. 2009; 24: 1-6.
11. Ekberg O, Hamdy S, Woisard V, Wuttge-Hannig A, Ortega P. Social and psychological burden of dysphagia: Its impact on diagnosis and treatment. Dysphagia. 2002; 17: 139-146.
12. Rangira D, Najeeb H, Shune SE, Namasivayam-MacDonald A. Understanding burden in caregivers of adults with dysphagia: A systematic review. Am J Speech Lang Pathol. 2022; 31: 486-501.
13. Earp JA, Ennett ST. Conceptual models for health education research and practice. Health Educ Res. 1991; 6: 163-171.
14. Madhavan A. Preclinical dysphagia in community dwelling older adults: What should we look for? Am J Speech Lang Pathol. 2021; 30: 833-843.
15. Madhavan A, LaGorio LA, Crary MA, Dahl WJ, Carnaby GD. Prevalence of and risk factors for dysphagia in the community dwelling elderly: A systematic review. J Nutr Health Aging. 2016; 20: 806-815.
16. Namasivayam-MacDonald A, Lam B, Ma J, Affoo R. Prevalence, incidence, and predictors of self-reported swallowing difficulties in community-dwelling adults: A population-based study from the Canadian longitudinal study on aging (CLSA). Dysphagia. 2023; 38: 1406-1420.
17. Robison R, Garand KL, Affoo R, Yeh CK, Chin N, McArthur C, et al. New horizons in understanding oral health and swallowing function within the context of frailty. Age Ageing. 2023; 52: afac276.
18. Zuckerman M, Wang S, Kaneoka A, Coster WJ, Leonard R, Langmore SE, et al. Conceptualizing adult dysphagia in the United States within the international classification of functioning, disability and health (ICF). Arch Phys Med Rehabil. 2024; 105: 1008-1018.
19. Rimer BK, Glanz K. Theory at a glance: A guide for health promotion practice. Bethesda, MD: US Department of Health and Human Services, National Institutes of Health, National Cancer Institute; 2005.
20. Sallis JF, Owen N, Fisher EB. Ecological models of health behavior. In: Health behavior and health education: Theory, research, and practice. 4th ed. San Francisco, CA: Jossey-Bass; 2008. pp. 465-486.
21. Garand KL, Beall J, Hill EG, Davidson K, Blair J, Pearson Jr W, et al. Effects of presbyphagia on oropharyngeal swallowing observed during modified barium swallow studies. J Nutr Health Aging. 2022; 26: 973-980.
22. Jardine M, Miles A, Allen J. Dysphagia onset in older adults during unrelated hospital admission: Quantitative videofluoroscopic measures. Geriatrics. 2018; 3: 66.

23. Mancopes R, Gandhi P, Smaoui S, Steele CM. Which physiological swallowing parameters change with healthy aging? OBM Geriat. 2021; 5. doi: 10.21926/obm.geriatr.2101153.
24. Cohen SM, Lekan D, Risoli T, Lee HJ, Misono S, Whitson HE, et al. Association between dysphagia and inpatient outcomes across frailty level among patients ≥50 years of age. Dysphagia. 2020; 35: 787-797.
25. Nagai T, Wakabayashi H, Nishioka S, Momosaki R. Functional prognosis in patients with sarcopenic dysphagia: An observational cohort study from the Japanese sarcopenic dysphagia database. Geriatr Gerontol Int. 2022; 22: 839-845.
26. Bartlett RS, Thibeault SL. Insights into oropharyngeal dysphagia from administrative data and clinical registries: A literature review. Am J Speech Lang Pathol. 2018; 27: 868-883.
27. Zheng M, Zhou S, Hur K, Chambers T, O'Dell K, Johns M. Disparities in the prevalence of self-reported dysphagia and treatment among US adults. Am J Otolaryngol. 2023; 44: 103774.
28. Lim Y, Kim C, Park H, Kwon S, Kim O, Kim H, et al. Socio-demographic factors and diet-related characteristics of community-dwelling elderly individuals with dysphagia risk in South Korea. Nutr Res Pract. 2018; 12: 406-414.
29. Zhang H, Ye C, Zhang S, Yang D, Gong X, Li S, et al. Association between health literacy and dysphagia in the community-dwelling older population: A cross-sectional study. Aging Clin Exp Res. 2023; 35: 2165-2172.
30. Berkman ND, Davis TC, McCormack L. Health literacy: What is it? J Health Commun. 2010; 15: 9-19.
31. Phelan JC, Link BG, Tehranifar P. Social conditions as fundamental causes of health inequalities: Theory, evidence, and policy implications. J Health Soc Behav. 2010; 51: S28-S40.
32. Hollinghurst J, Smithard DG. Identifying dysphagia and demographic associations in older adults using electronic health records: A national longitudinal observational study in Wales (United Kingdom) 2008-2018. Dysphagia. 2022; 37: 1612-1622.
33. Adkins C, Takakura W, Spiegel BM, Lu M, Vera-Llonch M, Williams J, et al. Prevalence and characteristics of dysphagia based on a population-based survey. Clin Gastroenterol Hepatol. 2020; 18: 1970-1979.e2.
34. Faigle R, Bahouth MN, Urrutia VC, Gottesman RF. Racial and socioeconomic disparities in gastrostomy tube placement after intracerebral hemorrhage in the United States. Stroke. 2016; 47: 964-970.
35. Jones HN, Leiman DA, Porter Starr KN, North R, Pieper CF, Robison RD, et al. Dysphagia in older adults is associated with food insecurity and being homebound. J Appl Gerontol. 2023; 42: 1993-2002.
36. Petersen PE. The world oral health report 2003: Continuous improvement of oral health in the 21st century-the approach of the WHO global oral health programme. Community Dent Oral Epidemiol. 2003; 31: 3-24.
37. Drancourt N, El Osta N, Decerle N, Hennequin M. Relationship between oral health status and oropharyngeal dysphagia in older people: A systematic review. Int J Environ Res Public Health. 2022; 19: 13618.
38. Rech RS, de Goulart BN, Dos Santos KW, Marcolino MA, Hilgert JB. Frequency and associated factors for swallowing impairment in community-dwelling older persons: A systematic review and meta-analysis. Aging Clin Exp Res. 2022; 34: 2945-2961.

39. Okamoto N, Morikawa M, Yanagi M, Amano N, Tomioka K, Hazaki K, et al. Association of tooth loss with development of swallowing problems in community-dwelling independent elderly population: The Fujiwara-kyo study. J Gerontol A Biol Sci Med Sci. 2015; 70: 1548-1554.
40. Pérez-Zepeda MU, Godin J, Armstrong JJ, Andrew MK, Mitnitski A, Kirkland S, et al. Frailty among middle-aged and older Canadians: Population norms for the frailty index using the Canadian longitudinal study on aging. Age Ageing. 2021; 50: 447-456.
41. Kojima G. Frailty as a predictor of nursing home placement among community-dwelling older adults: A systematic review and meta-analysis. J Geriatr Phys Ther. 2018; 41: 42-48.
42. Cunha AI, Veronese N, de Melo Borges S, Ricci NA. Frailty as a predictor of adverse outcomes in hospitalized older adults: A systematic review and meta-analysis. Ageing Res Rev. 2019; 56: 100960.
43. Lahousse L, Maes B, Ziere G, Loth DW, Verlinden VJ, Zillikens MC, et al. Adverse outcomes of frailty in the elderly: The Rotterdam study. Eur J Epidemiol. 2014; 29: 419-427.
44. Mitnitski AB, Mogilner AJ, Rockwood K. Accumulation of deficits as a proxy measure of aging. ScientificWorldJournal. 2001; 1: 323-336.
45. Fried LP, Tangen CM, Walston J, Newman AB, Hirsch C, Gottdiener J, et al. Frailty in older adults: Evidence for a phenotype. J Gerontol A Biol Sci Med Sci. 2001; 56: M146-M157.
46. Yang RY, Yang AY, Chen YC, Lee SD, Lee SH, Chen JW. Association between dysphagia and frailty in older adults: A systematic review and meta-analysis. Nutrients. 2022; 14: 1812.
47. Sakai K, Nakayama E, Yoneoka D, Sakata N, Iijima K, Tanaka T, et al. Association of oral function and dysphagia with frailty and sarcopenia in community-dwelling older adults: A systematic review and meta-analysis. Cells. 2022; 11: 2199.
48. Tanaka T, Takahashi K, Hirano H, Kikutani T, Watanabe Y, Ohara Y, et al. Oral frailty as a risk factor for physical frailty and mortality in community-dwelling elderly. J Gerontol A. 2018; 73: 1661-1667.
49. Kelly J, Wright D, Wood J. Medicine administration errors in patients with dysphagia in secondary care: A multi-centre observational study. J Adv Nurs. 2011; 67: 2615-2627.
50. Miarons M, Campins L, Palomera E, Serra-Prat M, Cabré M, Rofes L. Drugs related to oropharyngeal dysphagia in older people. Dysphagia. 2016; 31: 697-705.
51. Crouse EL, Alastanos JN, Bozymski KM, Toscano RA. Dysphagia with second-generation antipsychotics: A case report and review of the literature. Ment Health Clin. 2017; 7: 56-64.
52. Miarons M, Rofes L. Systematic review of case reports of oropharyngeal dysphagia following the use of antipsychotics. Gastroenterol Hepatol. 2019; 42: 209-227.
53. Langmore SE, Terpenning MS, Schork A, Chen Y, Murray JT, Lopatin D, et al. Predictors of aspiration pneumonia: How important is dysphagia? Dysphagia. 1998; 13: 69-81.
54. Malandraki GA, Sutton BP, Perlman AL, Karampinos DC, Conway C. Neural activation of swallowing and swallowing-related tasks in healthy young adults: An attempt to separate the components of deglutition. Hum Brain Mapp. 2009; 30: 3209-3226.
55. Martin R, Barr A, MacIntosh B, Smith R, Stevens T, Taves D, et al. Cerebral cortical processing of swallowing in older adults. Exp Brain Res. 2007; 176: 12-22.
56. Martin RE, Goodyear BG, Gati JS, Menon RS. Cerebral cortical representation of automatic and volitional swallowing in humans. J Neurophysiol. 2001; 85: 938-950.

57. Toogood JA, Smith RC, Stevens TK, Gati JS, Menon RS, Theurer J, et al. Swallowing preparation and execution: Insights from a delayed-response functional magnetic resonance imaging (fMRI) study. Dysphagia. 2017; 32: 526-541.
58. Jo SY, Hwang JW, Pyun SB. Relationship between cognitive function and dysphagia after stroke. Ann Rehabil Med. 2017; 41: 564-572.
59. Maniaci A, Lechien JR, La Mantia I, Iannella G, Ferlito S, Albanese G, et al. Cognitive impairment and mild to moderate dysphagia in elderly patients: A retrospective controlled study. Ear Nose Throat J. 2022; 103: NP671-NP678.
60. Yang EJ, Kim KW, Lim JY, Paik NJ. Relationship between dysphagia and mild cognitive impairment in a community-based elderly cohort: The Korean longitudinal study on health and aging. J Am Geriatr Soc. 2014; 62: 40-46.
61. Yatabe N, Takeuchi K, Izumi M, Furuta M, Takeshita T, Shibata Y, et al. Decreased cognitive function is associated with dysphagia risk in nursing home older residents. Gerodontology. 2018; 35: 376-381.
62. Chen H, Iinuma M, Onozuka M, Kubo KY. Chewing maintains hippocampus-dependent cognitive function. Int J Med Sci. 2015; 12: 502-509.
63. Han JH, Lee HJ, Han JW, Suh SW, Lee JR, Byun S, et al. Loss of functional dentition is associated with cognitive impairment. J Alzheimers Dis. 2020; 73: 1313-1320.
64. Weijenberg RA, Scherder EJ, Lobbezoo F. Mastication for the mind-the relationship between mastication and cognition in ageing and dementia. Neurosci Biobehav Rev. 2011; 35: 483-497.
65. Fávaro-Moreira NC, Krausch-Hofmann S, Matthys C, Vereecken C, Vanhauwaert E, Declercq A, et al. Risk factors for malnutrition in older adults: A systematic review of the literature based on longitudinal data. Adv Nutr. 2016; 7: 507-522.
66. Leira J, Maseda A, Lorenzo-López L, Cibeira N, López-López R, Lodeiro L, et al. Dysphagia and its association with other health-related risk factors in institutionalized older people: A systematic review. Arch Gerontol Geriatr. 2023; 110: 104991.
67. Pourhassan M, Rommersbach N, Lueg G, Klimek C, Schnatmann M, Liermann D, et al. The impact of malnutrition on acute muscle wasting in frail older hospitalized patients. Nutrients. 2020; 12: 1387.
68. Nakao-Kato M, Izumi SI, Nishioka S, Momosaki R, Wakabayashi H. The relationship between low skeletal muscle mass and subsequent oral intake ability among the aged population. Healthcare. 2023; 11: 729.
69. Maeda K, Akagi J. Sarcopenia is an independent risk factor of dysphagia in hospitalized older people. Geriatr Gerontol Int. 2016; 16: 515-521.
70. Maehara T, Nishimura R, Yoshitake A, Tsukamoto M, Kadomatsu Y, Kubo Y, et al. Association of daily physical activity and leisure-time exercise with dysphagia risk in community-dwelling older adults: A cross-sectional study. Sci Rep. 2023; 13: 10893.
71. Seiberling KA, Conley DB. Aging and olfactory and taste function. Otolaryngol Clin North Am. 2004; 37: 1209-1228.
72. Christova M, Aftenberger H, Nardone R, Gallasch E. Adult gross motor learning and sleep: Is there a mutual benefit? Neural Plast. 2018; 2018: 3076986.
73. Dua K, Bardan E, Ren J, Sui Z, Shaker R. Effect of chronic and acute cigarette smoking on the pharyngoglottal closure reflex. Gut. 2002; 51: 771-775.

74. Ninfa A, Crispiatico V, Pizzorni N, Bassi M, Casazza G, Schindler A, et al. The care needs of persons with oropharyngeal dysphagia and their informal caregivers: A scoping review. PLoS One. 2021; 16: e0257683.
75. Xue W, He X, Su J, Li S, Zhang H. Association between dysphagia and activities of daily living in older adults: A systematic review and meta-analysis. Eur Geriatr Med. 2024. doi: 10.1007/s41999-024-00999-8.
76. Takizawa C, Gemmell E, Kenworthy J, Speyer R. A systematic review of the prevalence of oropharyngeal dysphagia in stroke, Parkinson's disease, Alzheimer's disease, head injury, and pneumonia. Dysphagia. 2016; 31: 434-441.
77. Ghannouchi I, Speyer R, Doma K, Cordier R, Verin E. Swallowing function and chronic respiratory diseases: Systematic review. Respir Med. 2016; 117: 54-64.
78. Roy N, Stemple J, Merrill RM, Thomas L. Dysphagia in the elderly: Preliminary evidence of prevalence, risk factors, and socioemotional effects. Ann Otol Rhinol Laryngol. 2007; 116: 858-865.
79. Cabre M, Serra-Prat M, Palomera E, Almirall J, Pallares R, Clavé P. Prevalence and prognostic implications of dysphagia in elderly patients with pneumonia. Age Ageing. 2010; 39: 39-45.
80. Mancopes R, Borowsky da Rosa F, Tomasi LL, Pasqualoto AS, Steele CM. Chronic obstructive pulmonary disease and dysphagia: What have we learned so far and what do we still need to investigate? Perspect ASHA Spec Interest Groups. 2021; 6: 1212-1221.
81. Marra L, Cavallaro G, Di Lecce V, Castellana G, Santomasi C, Di Nicola V, et al. The association between dysphagia and OSA. Acta Otorhinolaryngol Ital. 2022; 42: 82-88.
82. Cvejic L, Guiney N, Nicholson T, Lau KK, Finlay P, Hamza K, et al. Aspiration and severe exacerbations in COPD: A prospective study. ERJ Open Res. 2021; 7. doi: 10.1183/23120541.00735-2020.
83. Nagami S, Oku Y, Yagi N, Sato S, Uozumi R, Morita S, et al. Breathing-swallowing discoordination is associated with frequent exacerbations of COPD. BMJ Open Respir Res. 2017; 4: e000202.
84. Chaves RD, Carvalho CR, Cukier A, Stelmach R, Andrade CR. Symptoms of dysphagia in patients with COPD. J Bras Pneumol. 2011; 37: 176-183.
85. Panebianco M, Marchese-Ragona R, Masiero S, Restivo DA. Dysphagia in neurological diseases: A literature review. Neurol Sci. 2020; 41: 3067-3073.
86. Feinberg MJ, Ekberg O, Segall L, Tully J. Deglutition in elderly patients with dementia: Findings of video fluorographic evaluation and impact on staging and management. Radiology. 1992; 183: 811-814.
87. Affoo RH, Foley N, Rosenbek J, Kevin Shoemaker J, Martin RE. Swallowing dysfunction and autonomic nervous system dysfunction in Alzheimer's disease: A scoping review of the evidence. J Am Geriatr Soc. 2013; 61: 2203-2213.
88. Alagiakrishnan K, Bhanji RA, Kurian M. Evaluation and management of oropharyngeal dysphagia in different types of dementia: A systematic review. Arch Gerontol Geriatr. 2013; 56: 1-9.
89. Aghaz A, Alidad A, Hemmati E, Jadidi H, Ghelichi L. Prevalence of dysphagia in multiple sclerosis and its related factors: Systematic review and meta-analysis. Iran J Neurol. 2018; 17: 180-188.
90. Ansari NN, Tarameshlu M, Ghelichi L. Dysphagia in multiple sclerosis patients: Diagnostic and evaluation strategies. Degener Neurol Neuromuscul Dis. 2020; 10: 15-28.
91. Guan XL, Wang H, Huang HS, Meng L. Prevalence of dysphagia in multiple sclerosis: A systematic review and meta-analysis. Neurol Sci. 2015; 36: 671-681.

92. Simons JA. Swallowing dysfunctions in Parkinson's disease. Int Rev Neurobiol. 2017; 134: 1207-1238.
93. Suttrup I, Warnecke T. Dysphagia in Parkinson's disease. Dysphagia. 2016; 31: 24-32.
94. Affoo RH, Dasgupta M, Martin RE. Dysphagia in delirium: Two cases. J Am Geriatr Soc. 2012; 60: 1975-1976.
95. Makhnevich A, Marziliano A, Ahmad SE, Ardito S, Ilyas A, Qiu M, et al. Factors and outcomes associated with dysphagia in hospitalized persons with dementia. J Am Med Dir Assoc. 2022; 23: 1354-1359.e2.
96. Hutcheson KA, Nurgalieva Z, Zhao H, Gunn GB, Giordano SH, Bhayani MK, et al. Two-year prevalence of dysphagia and related outcomes in head and neck cancer survivors: An updated SEER-Medicare analysis. Head Neck. 2019; 41: 479-487.
97. Ortega O, Parra C, Zarcero S, Nart J, Sakwinska O, Clavé P. Oral health in older patients with oropharyngeal dysphagia. Age Ageing. 2014; 43: 132-137.
98. Furuya J, Suzuki H, Tamada Y, Onodera S, Nomura T, Hidaka R, et al. Food intake and oral health status of inpatients with dysphagia in acute care settings. J Oral Rehabil. 2020; 47: 736-742.
99. Hägglund P, Koistinen S, Olai L, Ståhlnacke K, Wester P, Levring Jäghagen E. Older people with swallowing dysfunction and poor oral health are at greater risk of early death. Community Dent Oral Epidemiol. 2019; 47: 494-501.
100. Hajjar ER, Cafiero AC, Hanlon JT. Polypharmacy in elderly patients. Am J Geriatr Pharmacother. 2007; 5: 345-351.
101. Marengoni A, Angleman S, Melis R, Mangialasche F, Karp A, Garmen A, et al. Aging with multimorbidity: A systematic review of the literature. Ageing Res Rev. 2011; 10: 430-439.
102. Papadopoulou SK, Mantzorou M, Voulgaridou G, Pavlidou E, Vadikolias K, Antasouras G, et al. Nutritional status is associated with health-related quality of life, physical activity, and sleep quality: A cross-sectional study in an elderly Greek population. Nutrients. 2023; 15: 443.
103. Watanabe K, Umegaki H, Huang CH, Arakawa Martins B, Asai A, Kanda S, et al. Association between dysphagia risk and unplanned hospitalization in older patients receiving home medical care. Geriatr Gerontol Int. 2019; 19: 977-981.
104. Mittal A, Patel M, Wang D, Khrais A, Chyn ET. Does dysphagia predict inpatient morbidity and mortality in geriatric patients admitted for aspiration pneumonia? Cureus. 2023; 15: e39223.
105. Patel DA, Krishnaswami S, Steger E, Conover E, Vaezi MF, Ciucci MR, et al. Economic and survival burden of dysphagia among inpatients in the United States. Dis Esophagus. 2018; 31: dox131.
106. Cabré M, Serra-Prat M, Force LL, Almirall J, Palomera E, Clavé P. Oropharyngeal dysphagia is a risk factor for readmission for pneumonia in the very elderly persons: Observational prospective study. J Gerontol A Biol Sci Med Sci. 2014; 69: 330-337.
107. Bosch G, Comas M, Domingo L, Guillen-Sola A, Duarte E, Castells X, et al. Dysphagia in hospitalized patients: Prevalence, related factors and impact on aspiration pneumonia and mortality. Eur J Clin Invest. 2023; 53: e13930.
108. Guyomard V, Fulcher RA, Redmayne O, Metcalf AK, Potter JF, Myint PK. Effect of dysphasia and dysphagia on inpatient mortality and hospital length of stay: A database study. J Am Geriatr Soc. 2009; 57: 2101-2106.
109. Nativ-Zeltzer N, Nachalon Y, Kaufman MW, Seeni IC, Bastea S, Aulakh SS, et al. Predictors of aspiration pneumonia and mortality in patients with dysphagia. Laryngoscope. 2022; 132: 1172-1176.

110. Bendsen BB, Jensen D, Westmark S, Krarup AL, Riis J, Melgaard D. The quality of life in citizens with oropharyngeal dysphagia-a cross-sectional study. J Clin Med. 2022; 11: 4212.
111. Jones E, Speyer R, Kertscher B, Denman D, Swan K, Cordier R. Health-related quality of life and oropharyngeal dysphagia: A systematic review. Dysphagia. 2018; 33: 141-172.
112. Leiman DA, Jones HN, North R, Porter Starr KN, Pieper CF, Cohen SM. Self-reported dysphagia and psychosocial health among community-dwelling older adults: Results of a national study. J Gen Intern Med. 2023; 38: 3329-3338.
113. Kim JH. The correlation between SWAL-QOL outcome and functional dysphagia scale in stroke patients. Ann Phys Rehabil Med. 2018; 61: e258.
114. Verdonschot RJ, Baijens LW, Serroyen JL, Leue C, Kremer B. Symptoms of anxiety and depression assessed with the hospital anxiety and depression scale in patients with oropharyngeal dysphagia. J Psychosom Res. 2013; 75: 451-455.
115. Nund RL, Ward EC, Scarinci NA, Cartmill B, Kuipers P, Porceddu SV. Carers' experiences of dysphagia in people treated for head and neck cancer: A qualitative study. Dysphagia. 2014; 29: 450-458.
116. Farri A, Accornero A, Burdese C. Social importance of dysphagia: Its impact on diagnosis and therapy. Acta Otorhinolaryngol Ital. 2007; 27: 83-86.
117. Bhattacharyya N. The prevalence of dysphagia among adults in the United States. Otolaryngol Head Neck Surg. 2014; 151: 765-769.
118. Martino R, Ringash J, Durkin L, Greco E, Huang SH, Xu W, et al. Feasibility of assessing patient health benefits and incurred costs resulting from early dysphagia intervention during and immediately after chemoradiotherapy for head-and-neck cancer. Curr Oncol. 2017; 24: e466-e476.
119. Biddle BJ. Recent developments in role theory. Annu Rev Sociol. 1986; 12: 67-92.
120. Andruske CL, O'Connor D. Family care across diverse cultures: Re-envisioning using a transnational lens. J Aging Stud. 2020; 55: 100892.