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Definition, Prevalence and Burden of Oropharyngeal Dysphagia: A Serious Problem among Older Adults Worldwide and the Impact on Prognosis and Hospital Resources

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Abstract

Oropharyngeal dysphagia describes difficulty with eating and drinking. This benign statement does not reflect the personal, social, and economic costs of the condition. Dysphagia has an insidious nature in that it cannot be ‘seen’ like a hemiplegia or a broken limb. It is often a comorbid condition, most notably of stroke, and many other neurodegenerative disorders. Conservative estimates of annual hospital costs associated with dysphagia run to USD 547 million. Length of stay rises by 1.64 days. The true prevalence of dysphagia is difficult to determine as it has been reported as a function of care setting, disease state and country of investigation. However, extrapolating from the literature, prevalence rises with admission to hospital and affects 55% of those in aged care settings. Consequences of dysphagia include malnutrition, dehydration, aspiration pneumonia and potentially death. The mean cost for an aspiration pneumonia episode of care is USD 17,000, rising with the number of comorbid conditions. Whilst financial costs can be objectively counted, the despair, depression, and social isolation are more difficult to quantify. Both sufferers and their families bear the social and psychological burden of dysphagia. There may be a cost-effective role for screening and early identification of dysphagia, particularly in high-risk populations.

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Introduction

Eating and drinking are essential to human survival as a form of nourishment. Aspects that affect this biological function are naturally a cause for concern.

However, mealtimes also have a social function, and the inability to participate in meals has devastating consequences including depression and social isolation for those affected and their significant others. The act of eating and swallowing requires intact cortical function, oral intake and manipulation, tongue propulsion allied with pharyngeal squeeze and larynx elevation, laryngeal closure with cricopharyngeal relaxation, and proper esophageal function. Of these five components, oropharyngeal function is pivotal to aspiration protection. While there are many possible etiologies and comorbidities, dysphagia is associated with prolonged hospitalization and higher risk of mortality in some populations. In order to adequately discuss the prevalence and burden of oropharyngeal dysphagia in older adults, it is first necessary to clarify our subject matter.

Definitions

Interest in dysphagia has built steadily over the last 30 years. At its most general, *dysphagia* is defined as ‘difficulty moving food from the mouth to the stomach’ [1]. On the other hand, *deglutition* is generally given to describe the preparatory, oral, pharyngeal and esophageal phases of swallowing [2]. This latter description paves the way for clarification of oropharyngeal versus esophageal dysphagia. Oropharyngeal dysphagia encompasses the oral preparatory, oral and pharyngeal phases of swallowing. The oral preparatory phase includes difficulties associated with biting, closure of the lips, chewing and mastication, mixing of the bolus with saliva, and segmenting the bolus in the oral cavity for safe swallowing. It is under voluntary control. The oral phase includes the ability to contain and control the bolus. The tongue provides the bolus with shaping, transport through and propulsion into the pharynx; this is also part of the oral phase. The pharyngeal phase consists of transport of the bolus through and removal of residue from the pharynx. Once the bolus has passed through the upper esophageal sphincter, the pharyngeal phase has been completed and the esophageal phase has commenced. Both the pharyngeal and esophageal phases are reflexive. The esophageal phase involves bolus transport through the esophagus and into the stomach. Impairments in the esophageal phase may be the consequence of obstruction or motility issues. This information is summarized in figure 1.

While the traditional description of deglutition involves the phases listed above, the brain (cortex and brainstem) plays important roles in the cognition and reflexes involved in swallowing. Also, the role of the larynx should not be excluded, as intact sensation, true and false vocal fold closure and cricopharyngeal relaxation are supremely important.

This paper will focus on the prevalence and burden of *oropharyngeal* dysphagia utilizing the description above. The consequences of oropharyngeal dysphagia broadly affect (1) respiratory safety (aspiration), and (2) swallowing

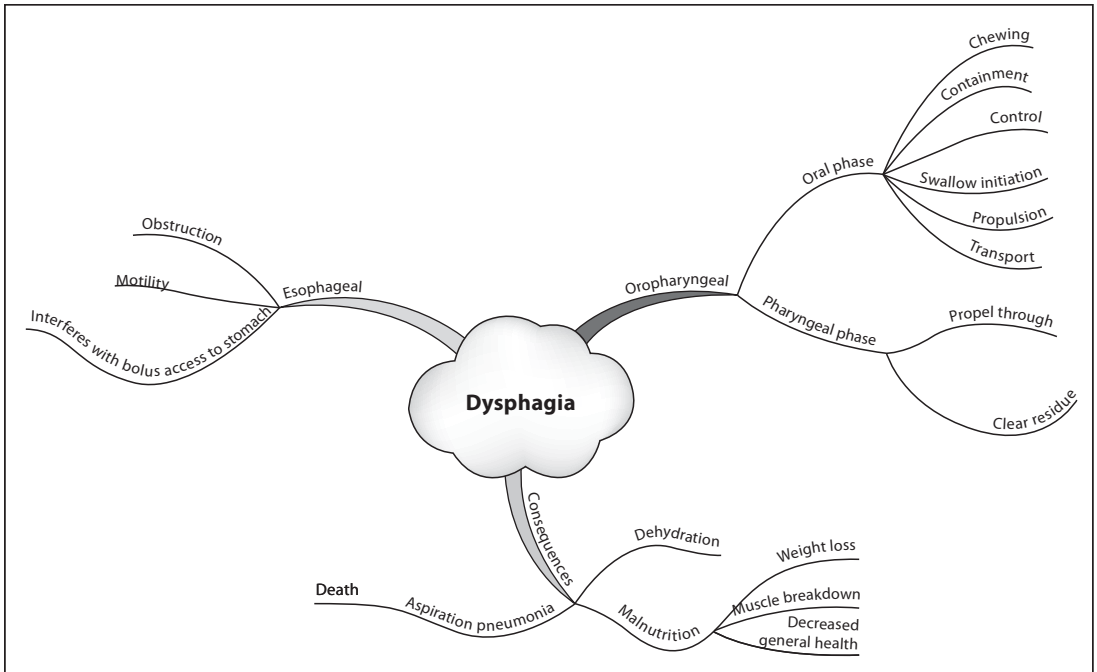


Fig. 1. Definition: oropharyngeal dysphagia vs. esophageal dysphagia.

efficiency (adequacy of nutrition and hydration per oral route). The consequences of oropharyngeal dysphagia will be discussed in detail in other papers in this volume.

The World Health Organization describes ‘older adults’ as those individuals who are over 60 years of age, and in developed countries, those over 65 years of age. In the popular press, older adults are usually classified as those who have reached retirement age. This varies from country to country. For example, in Australia the retirement age is 65 years, whilst in Norway it is 67 years. In the research literature, older adults are classified as those over 70 years, with a mean age of 84 years [3]. In other literature, 85 years of age is classified as ‘the oldest old’ [4]. In the study by Cabre et al. [3], older adults with dysphagia presenting to acute care were most likely to:

- Have a poor functional capacity
- Have a geriatric diagnosis (e.g. previous stroke, dementia)
- Live in a nursing home
- Take a large number of medications
- Take a larger proportion of medications that affect level of consciousness or affect the swallowing response (e.g. sedatives, antipsychotic medications, antidepressants)

Prevalence of Oropharyngeal Dysphagia

The true prevalence of oropharyngeal dysphagia is difficult to determine. Research studies have categorized prevalence according to disease state (e.g. stroke); setting (e.g. acute hospital, nursing home, community dwelling) and country of interest. Due to differences in culture, lifestyle habits, diet, health care services and practices, and data collection processes, the ability to generalize findings from one country to another is difficult [5]. Naturally, the prevalence fluctuates according to each of these variables. In the acute care setting, the prevalence ranges from 0.35% physician recorded [6] to 25% assessed [7], and as high as 55% of elderly individuals consecutively admitted to hospital with pneumonia (Spain) [3]. Altman et al. [6] utilized data from a large hospital survey database. In the latter studies with very high prevalence rates, dysphagia screening tools were used to identify individuals at risk of dysphagia and/or aspiration. In the nursing home setting, the figures are more pronounced with prevalence rates between 55 (USA study) [8] and 68% (Canadian study) [9]. Those dwelling in the community show a different prevalence picture. Oropharyngeal dysphagia prevalence figures of 11, 13 and 16% have been reported in the UK, Japan and the Netherlands, respectively, for older community-dwelling residents [10–12]. It should be noted that in the acute and nursing home settings, diagnosis of oropharyngeal dysphagia was confirmed by formal dysphagia assessment. However, community prevalence data come from self-reports on questionnaires. It is likely that the community prevalence of oropharyngeal dysphagia is higher than that formally documented in the research literature.

In 2002, a study conducted over four European countries examined the social and psychological impact of dysphagia [13]. The investigators found that of the group sampled, only 40% reported receiving a formal diagnosis of dysphagia. Country to country variation in symptoms was noted. For example, nursing home residents in the UK and Spain were more likely to report difficulties swallowing thin liquids, whilst individuals in Germany and France were less likely to report these difficulties. Individuals in the UK and France had the highest percentage of coexisting medical conditions (79 and 81%), compared with those residents in Germany and Spain (43 and 67%). A third of all residents in the study needed personal assistance when eating.

Prevalence data for oropharyngeal dysphagia have also been presented according to disease state. Stroke is the condition most commonly linked with dysphagia with a wide prevalence of between 14 and 94% [14]. However, other conditions that affect the central nervous system also present with risk for dysphagia. For example, dysphagia has been reported in one third of individuals with Parkinson's disease [15], and by the time of death reports of up to 81% prevalence of dysphagia have been reported in individuals with motor neuron disease [16].

The prevalence of oropharyngeal dysphagia increases with advancing age. 10–30% of individuals older than 65 years are estimated to have swallowing

difficulties [17]. Increasing age is associated with increased risk for dysphagia. The prevalence of other comorbidities, such as stroke, also increases with advancing age; hence, age risks are most likely associated with comorbidity risks. Individuals aged over 65 years represented half of all admissions for aspiration pneumonia in the 1995 calendar year in the USA and a mortality rate of more than 25% [18]. The United Nations (Department of Economic and Social Affairs – Population Division) notes that by the year 2050 one third of the population in the developed world will be aged over 60 years [19]. In the developing world, this figure will reach 20%. Due to a decline in fertility and an increase in longevity, for the first time in history there will be more elders than young people. The number of individuals affected by oropharyngeal dysphagia looks set to rise.

Although swallowing difficulties increase with advancing age, for many there is the belief that it is an inevitable part of ageing, and thus there is a failure to seek help [12]. Other reasons for not seeking treatment include [13, 20]:

- Poor awareness that treatment for dysphagia was available
- Belief that the dysphagia could not be treated
- Not bothered enough by the problem
- Difficulties with
 - travel to therapy
 - time commitment to therapy or
 - expense of therapy

Impact of Diagnosis of Dysphagia on Prognosis

The prevalence of dysphagia in the hospital setting is not completely known. Data collection processes can yield varying outcomes and likely account for the disparities reported in the literature. For example, dysphagia prevalence was found to be 6.7% in an acute hospital setting, representing patients identified using a nurse-administered dysphagia screening tool, verified by speech pathology and found to require NPO or texture-modified diets. It did not include individuals requiring thickened liquids, however [7]. In contrast, a dysphagia prevalence rate of 0.35% was identified in a large hospital survey database, as described in the United States National Hospital Discharge Survey (NHDS) from 2005 to 2006. In this study, however, the rate of dysphagia was double (0.73% of all hospitalizations) in the age group >75 years old compared to 45–64 years old [6]. Other selected populations are also at much higher risk of having dysphagia, including stroke, and neurodegenerative disease. Also, according to the NHDS study the most common dysphagia-related comorbid conditions were (1) fluid and electrolyte disorder (i.e. dehydration), (2) disease of the esophagus (i.e. reflux or tumor), (3) ischemic stroke, and (4) aspiration pneumonia, accounting for about half of all dysphagia hospitalizations.

Economic burden	Social burden	Physical burden	Psychological burden
<ul style="list-style-type: none"> • Cost of dysphagia • Cost of aspiration episode • Increasing costs due to aging population 	<ul style="list-style-type: none"> • Social isolation • Fatalistic • Part of normal ageing? • Treatment available? • Treatment effective? 	<ul style="list-style-type: none"> • Weight loss • Malnutrition • Dehydration • Increased dependence 	<ul style="list-style-type: none"> • Less enjoyment of eating • Depression • Person with dysphagia • Caregiver

Fig. 2. Visual summary: the burden of oropharyngeal dysphagia.

In the hospital setting, dysphagia portends a poor prognosis and ultimately is associated with longer hospital stay, higher costs, and greater risk of mortality. In a study involving the 2003 NHDS, 45% of patients with stroke and dysphagia had hospital length of stay >7 days, compared to 15% of patients with stroke and no dysphagia [21]. Furthermore, only 21% of stroke patients with dysphagia were discharged home compared to 60% of those with no dysphagia. In the more recent study of the NHDS from 2005–2006, the presence of dysphagia in all patients was shown to be associated with 40% increased length of stay (4 days compared to 2.4-day hospitalization in patients without dysphagia) [6]. Mortality was 13 times higher in patients with dysphagia in the rehabilitation setting compared to those with no dysphagia, and 1.8–2.6 times higher during hospitalizations associated with cardiac dysrhythmias and atherosclerosis, respectively.

The consequence of dysphagia in the hospitalized population as described in these studies reflects a number of important conclusions. Namely, (1) dysphagia is underappreciated in the hospital population, and therefore one may surmise that there is some delay in identifying its presence and consequences, (2) these patients are at higher risk of complications such as aspiration pneumonia, malnutrition and potentially death, and (3) certain populations are at higher risk for dysphagia, where there may be a cost-effective role for screening and early intervention.

Burden

Oropharyngeal dysphagia presents many different burdens including physical, social, psychological and economic. These factors are summarized in figure 2. An inability to safely or efficiently eat and drink has pronounced consequences for malnutrition and dehydration. The consequences of dysphagia and

malnutrition include: fatigue, aspiration pneumonia, weight loss, dehydration, muscle breakdown, and an overall decline in general health [22]. The threats of sarcopenia and protein-energy malnutrition are ever present for individuals with dysphagia.

In the European study of aged care residents 84% of those surveyed said that eating should be an enjoyable experience; however, only 45% actually considered this to be the case [13]. Individuals reported eating in isolation because they were embarrassed by their swallowing difficulties, and experienced anxiety or panic during mealtimes. Half of those surveyed indicated that swallowing difficulties made life less enjoyable [13].

Dysphagia has been linked with low mood or depression [10]. More than half of the 360 patients in the Ekberg study [13] reported that dysphagia made their life less enjoyable. Feelings of isolation, anxiety and panic at mealtimes, embarrassment and loss of self-esteem significantly reduced quality of life in individuals with dysphagia [13].

With physical changes associated with oropharyngeal dysphagia, there is also an increased physical burden for caregivers. Individuals with dementia often develop dysphagia, and aversive feeding behaviors in this group are common with disease progression. Eating difficulties lead to significant stress for caregivers and health care providers [23, 24]. Caregivers who feel overburdened by behaviors such as turning the head away, pushing the food or feeder away, or accepting food into the mouth but then failing or refusing to swallow, often do not have the physical, emotional or cognitive strategies required to help the person with Alzheimer's disease and dysphagia eat [23]. In fact, the quality of the carer-patient relationship during meals has been noted to account for 32% of variance of food consumed [24]. Where feeding assistance is needed, meals can take as long as 34 min [9]. With increased caregiver burden associated with aversive feeding behavior, there is greater difficulty maintaining the person at home and a higher likelihood of requirement for nursing home placement. It is poignant to note that we can assist people with dysphagia by first assisting their caregivers.

Impact on Hospital Resources

Consequences of oropharyngeal dysphagia can broadly include: weight loss, dehydration, malnutrition, and aspiration pneumonia. The latter is of particular concern due to its link with death. Based on dysphagia present in 0.35% of hospitalized patients, 1.64-day average increased length of stay (considering the 2005–2006 NHDS at 4 days compared to 2.4-day hospitalization in patients without dysphagia), and a conservative estimated USD 2,454 daily fixed and variable costs, the economic impact of dysphagia in the hospital setting was calculated to be USD 547 million annually [6]. This is a low estimate not only

Table 1. Summary of economic costs of oropharyngeal dysphagia [6]

Increased length of stay, days	
Without dysphagia	2.4
With dysphagia	4
Daily fixed and variable costs of dysphagia, USD	2,454
Conservative annual economic cost of dysphagia, USD	547 million

Table 2. Summary of economic costs associated with treatment of aspiration pneumonia, a consequence of oropharyngeal dysphagia

Average length of hospital stay [18], days	16
Mean cost of care per episode of aspiration pneumonia [26], USD	17,000
Cost range for care per episode of aspiration pneumonia depending on number of comorbidities [26], CA	11,000–94,000
Mortality at 1 year [3], %	
With oropharyngeal dysphagia	55
With safe swallowing function	27

because of the lower than expected prevalence, but also because variable costs associated with dysphagia would likely be far greater based on needs for enteral nutrition as well as the consequences of aspiration. Information regarding costs associated with oropharyngeal dysphagia is summarized in table 1.

Treatment of malnutrition, dehydration and aspiration often requires hospital care and medication. Medication costs for i.v. antibiotics have been reported to range from USD 12.70 to 443.70 per course of treatment [25]. In addition to medication, there are also costs associated with staffing and investigative procedures such as X-ray. In a study conducted in the USA in 1995, there were 300,000 admissions for aspiration pneumonia. The mean length of stay was 16.1 days with an average cost of USD 32,000 [18]. In a recent Canadian study, the cost of treatment for aspiration pneumonia increased significantly depending on the number of comorbidities the patient presented with [26]. Although the mean cost per patient was CA ~17,000, it varied from CA 11,000 to 94,000 depending on the number of comorbidities. A team approach to care can minimize costs. For example, the annual costs associated with management of hospitalized chest infections fell from GBP 48.2 million to 26.1 million when speech pathologists were involved in patient care [27]. Information regarding costs associated with aspiration pneumonia is summarized in table 2.

Once oropharyngeal dysphagia is recognized in a hospitalized patient, options generally include rehabilitation, oral diet limitation, as well as recognizing the trade-off between short-term and longer-term enteral nutrition. The use

of the percutaneous endoscopic gastrostomy (PEG) allows for such non-oral feeding, bypassing the oropharyngeal region and supplying required nutrients and hydration directly to the stomach. Therein lies the importance of a team approach to properly diagnose the etiology of dysphagia, and determine prognosis for reasonable recovery.

In the case of stroke patients, the FOOD (Feed Or Ordinary Diet) trials were established to determine the roles of routine oral nutritional supplementation, as well as timing and method of enteral feeding for dysphagia stroke patients [28, 29]. These were multicenter randomized controlled trials involving 4,023 patients at 125 hospitals in 15 countries, whose primary outcome measure was death or Modified Rankin Scale grade 3–5 [28]. In the initial study, only 8% of patients were found to have nutritional deficiency upon admission. In addition to the normal hospital diet, those with additional nutritional supplements did not conclude any meaningful difference in their outcome.

In the sub-study focusing on the potential benefits of enteral feeding, patients were randomized to early enteral feeding versus no tube feeding, and the study found that early tube feeding was associated with an absolute reduction in the risk of death by 5.8% [29]. However, when the study looked at early PEG versus nasogastric feeding, PEG was associated with an absolute increased risk of death in 1%, and an increased risk of death or poor outcome in 7.8%. While it is not immediately apparent, one possibility for this finding is an association with aspiration pneumonia episodes, reported in as many as 10% of patients following or associated with PEG at a cost of USD ~26,000 per admission [18].

However, dysphagia in stroke patients is a unique situation where it resolves in a significant number of patients by day 7 following a stroke. Early intervention with PEG during hospitalization with neurodegenerative disease, postsurgical debilitation and other high-risk groups has not been as thoroughly explored in the literature.

Conclusions

The prevalence of dysphagia is growing with the aging population, and has associations with comorbidities such as stroke and neurodegenerative diseases. In addition to the needs for hydration and nutrition, inability to swallow sufficiently may be associated with significant quality of life impairment and depression. Complications of dysphagia such as aspiration, particularly in the hospitalized population may have catastrophic consequences and add to the burden on healthcare resources.

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