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## Original Study

## The Impact of Dysphagia on Mortality of Nursing Home Residents: Results From the nutritionDay Project

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## A B S T R A C T

**Keywords:**  
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weight loss

**Objectives:** Dysphagia is a frequent finding in nursing home residents. The aim of this study is to evaluate the association of dysphagia and mortality in nursing home residents and identify further risk factors for mortality in residents with dysphagia.

**Design:** One-day, annually repeated cross-sectional study, evaluating the nutritional situation of nursing home residents with 6-month mortality as outcome.

**Setting:** 191 nursing homes from 14 countries in Europe and the United States participating in the nutritionDay study between 2007 and 2012.

**Participants:** Data of all nursing home residents in the nutritionDay study aged 65 years or older with available information about dysphagia and outcome were analyzed.

**Measurements:** Residents' characteristics and mortality rate were calculated by group comparison, and mortality risk was calculated by multivariate regression analysis with adjustment for potential confounding factors.

**Results:** 10,185 residents (78% female) with a mean age of  $85 \pm 8.1$  years were included in the analysis. Dysphagia was reported in 15.4% of residents. The 6-month mortality of residents with dysphagia was significantly higher than of those without dysphagia (24.7% vs 11.9%;  $P < .001$ ). The multivariate regression analysis revealed dysphagia [odds ratio (OR) 1.44, 95% confidence interval (CI) 1.24-1.68,  $P < .001$ ] along with body mass index  $<20$  (OR 1.78, 95% CI 1.55-2.03,  $P < .001$ ) and weight loss  $>5$  kg (OR 1.61, 95% CI 1.37-1.88,  $P < .001$ ) as independent and significant risk factors for mortality. Because of significant interaction, a disproportionately high mortality of 38.9% was found in residents with dysphagia accompanied by previous weight loss  $>5$  kg (OR for interaction 1.44; 95% CI 1.03-2.01;  $P = .032$ ). Tube feeding was reported in 14.6% of residents with dysphagia. The mortality rate of dysphagic residents receiving tube feeding vs those who were not was not significantly different (21.4% vs 25.3%;  $P = .244$ ).

**Conclusion:** In this nutritionDay study, dysphagia was identified as an independent risk factor for mortality in nursing home residents. Residents with dysphagia accompanied by weight loss are at a particularly high risk of mortality and should therefore receive special attention.

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Dysphagia is characterized by an impaired swallowing function that may be accompanied by corresponding symptoms. Retrosternal foreign body sensation, pain, or vomiting typically occurs in

esophageal dysphagia. Oropharyngeal dysphagia may be accompanied by symptoms such as wet voice, coughing, choking, or repeatedly clearing one's throat. However, dysphagia may also emerge with silent aspiration, that is, without overt symptoms, because of an impaired protective cough reflex. Dysphagia is associated with multiple negative health outcomes. Acute consequences are aspiration pneumonia and sudden bolus death; frequent chronic consequences are dehydration, malnutrition, and reduced quality of life, all of which may lead to increased mortality.

The authors declare no conflicts of interest.

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Older subjects generally demonstrate a high prevalence of dysphagia because of underlying diseases and age-related changes.<sup>1</sup> Common diseases of the central nervous system, such as stroke, Parkinson's disease, dementia and many others, frequently lead to chronic oropharyngeal dysphagia.<sup>2</sup> Typical changes of aging that may contribute to dysphagia are various and frequent; probably the most important one is sarcopenia,<sup>3,4</sup> which is why the prevalence of oropharyngeal dysphagia is particularly high in nursing home residents. Prevalence rates between 7% and 70% are described, depending on the definition of dysphagia and the diagnostic method used.<sup>5–8</sup>

In patients with dysphagia after stroke, increased mortality rates compared to those without dysphagia were reported.<sup>9</sup> However, it is not well known to what extent nursing home residents with dysphagia experience an increased risk of mortality. Therefore, we analyzed the data of the worldwide nutritionDay project regarding the association of dysphagia with mortality.

## Methods

The nutritionDay project evaluates the nutritional situation of hospital patients and nursing home residents in the form of an annual, voluntary 1-day cross-sectional survey. The survey was first performed in hospitals.<sup>10,11</sup> In 2007, the project was extended to nursing homes.<sup>12</sup> Outcome data are obtained after 30 days in hospital patients and after 6 months in nursing home residents. The following analysis is based on the complete data set of nutritionDay in nursing homes obtained from 2007 to 2012. The step-by-step data extraction is described in a previous study.<sup>13</sup>

The nutritionDay nursing home questionnaires are accessible in multiple languages. Five different sheets address distinct areas of the nursing home setting, such as unit structures, individual resident's characteristics, nutritional situation of each resident, and actual nutritional intake at lunch time of the index day; the outcomes are recorded after 6 months. All questionnaires are filled in by the staff. Detailed instructions and explanations for each question are provided. Dysphagia is determined by a dichotomous question (yes, no). The nursing home staff answered the question according to the resident's medical file or based on their knowledge about the existence of dysphagia. No further explanation on the term and definition of dysphagia was provided. All questionnaires and instructions are accessible at [www.nutritionday.org](http://www.nutritionday.org), but it has to be noted that some questionnaires changed over past last years. For further information, see also previous publications about the nutritionDay.<sup>10–13</sup>

For the present analysis, we used age, sex, body mass index (BMI), weight loss during previous year, tube feeding and the use of oral nutritional supplements (ONS), immobility, cognitive impairment, dysphagia, and mortality after 6 months. All these items were filled in by the staff, with the exception of the 2 questions about weight loss that could be filled in by the residents themselves, if they were competent. Cognitive impairment was rated as no, mild to moderate, or severe. Immobility was defined as bedridden or sitting in a wheelchair without autonomous mobility.

As exclusion criteria, we defined age below 65 years, missing BMI, missing weight loss information, missing data about dysphagia, and missing outcome data. Participants with a BMI below 10 or above 90 kg/m<sup>2</sup> and body height below 100 and above 210 cm as well as age above 125 years were excluded as implausible data.

## Statistics

The statistical analysis was carried out with SPSS, version 24 (IBM Corp, Armonk, NY). Descriptive statistics were used for residents' baseline characteristics. Group comparisons of continuous variables were performed using the Mann-Whitney *U* test. The chi-square test was applied to detect group differences between groups with nominal

data. A binary logistic regression analysis was performed with 6-month mortality as the dependent variable and dysphagia as the independent variable. Within this binary logistic regression analysis, we adjusted for age, gender, BMI <20, weight loss >5 kg in the previous year, severe cognitive impairment, immobility, tube feeding, and ONS in different models with increasing complexity. The level of significance was determined a priori at *P* < .05.

## Ethics

The nutritionDay nursing home concept was approved by the ethical committee of the Medical University of Vienna, Austria, and the University of Erlangen-Nürnberg, Germany. Every competent resident and the nominated proxies of incompetent residents were asked to give written or at least oral consent and were informed about the survey and that the participation could be rejected. No personal data were transferred to the coordinating center or stored in a database.

## Results

A total of 191 nursing homes with 26,651 nursing home residents from 14 countries participated in the survey between 2007 and 2012. After exclusion of residents with incomplete data, 10,185 data sets could be analyzed. Reasons for exclusion were missing outcome data (*n* = 12,656), age <65 years (*n* = 1976), missing or implausible anthropometric data (*n* = 914), probable repeaters (*n* = 807), and missing data on dysphagia (*n* = 113).

Mean age of the participants was 85.2 ± 8.1 years, and 78% were female. Mean BMI was 24.8 ± 5.5, and 11.3% lost more than 5 kg in the previous year. Dysphagia was reported in 15.4% of residents. Mortality after 6 months was 13.9% in all study participants. Sixth-month mortality was significantly higher in subjects with dysphagia compared to those without dysphagia (24.7% vs 11.9%; *P* < .001). Residents with dysphagia had a significantly lower BMI and more often weight loss >5 kg. Severe cognitive impairment and immobility were significantly more frequent in residents with dysphagia. Tube feeding (TF) was reported in 258 (2.5%) subjects, 13 nasogastric and 245 via percutaneous endoscopic gastrostomy. In 229 (88.8%) of the tube-fed residents, dysphagia was reported. Conversely, 14.6% of all dysphagic residents were tube fed (Table 1). In general, mortality in tube-fed patients was significantly higher compared with subjects without tube feeding (22.5% vs 13.6%, *P* < .001), but mortality in dysphagic residents with (21.4%) and without (25.3%) tube feeding did not differ significantly (*P* = .244). Accordingly, TF was no independent risk factor for mortality in the regression analysis. Similar results were found in 1247 (12.2%) residents receiving ONS. In general, the

**Table 1**  
Baseline Characteristics of Participants With and Without Dysphagia

Characteristic	No Dysphagia	Dysphagia	<i>P</i> Value
	8617 (84.6)	1568 (15.4)	
Female	6752 (78.7)	1206 (77.4)	
Male	1839 (21.3)	355 (22.6)	.238
Age, y, mean ± SD	85.2 (8.0)	85.0 (8.3)	.221
BMI, mean ± SD	25.3 (5.5)	22.4 (5.0)	<.001
BMI <20	1275 (14.8)	531 (33.9)	<.001
Weight loss >5 kg*	830 (9.6)	321 (20.5)	<.001
Oral nutritional supplements	877 (10.2)	370 (23.6)	<.001
Tube feeding	29 (0.3)	229 (14.6)	<.001
Severe cognitive impairment	2132 (24.7)	1005 (64.1)	<.001
Immobility	1897 (22.0)	1111 (70.9)	<.001
Mortality	1024 (11.9)	388 (24.7)	<.001

SD, standard deviation.

Values are n (%) unless otherwise indicated.

\*Weight loss during previous year.

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