Nutrición Hospitalaria

Nutr Hosp. 2015;32(4):1830-1836
ISSN 0212-1611 • CODEN NUHOEQ
S.V.R. 318

Original/*Otros*

Prevalence and costs of malnutrition in hospitalized dysphagic patients: a subanalysis of the PREDyCES® study

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Abstract

Introduction: **dysphagia and malnutrition are conditions that frequently appear together in hospitalized patients.**

Objectives: **the main purpose of this study was to analyze the prevalence of malnutrition in patients with dysphagia included in the PREDyCES® study as well as to determine its clinical and economic consequences.**

Methods: **this is a substudy of an observational, cross-sectional study conducted in 31 sites all over Spain.**

Results: **352 dysphagic patients were included. 45.7% of patients presented with malnutrition (NRS®-2002 ≥ 3) at admission and 42.2% at discharge. In elderly patients (≥ 70 years old) prevalence of malnutrition was even higher: 54.6% at admission and 57.5% at discharge. Also, prevalence of malnutrition was higher in urgent admissions versus those scheduled (45.7%** ***vs*** **33.3%; p < 0.05) and when admitted to small hospitals vs. large hospitals (62.8%** ***vs*** **43.9%; p < 0.001). In-hospital length of stay was higher in malnourished patients compared to those well-nourished (11.5 ± 7.1 days** ***vs.*** **8.8 ± 6.05 days; p < 0.001), and in malnourished patients a tendency towards increase related-costs was also observed, even though it was not statistically significant (8 004 ± 5 854 €** ***vs.*** **6 967 ± 5 630 €; p = 0.11). Length of stay was also higher in elderly patients (≥ 70 y/o)** ***vs*** **adults (< 70 y/o). 25% of dysphagic patients and 34.6% of malnourished patients with dysphagia received nutritional support during hospitalization.**

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Recibido: 29-VII-2015.
1.ª Revisión: 30-VII-2015.
Aceptado: 30-VIII-2015.

PREVALENCIA Y COSTES DE LA DESNUTRICIÓN EN PACIENTES HOSPITALIZADOS CON DISFAGIA: UN SUBANÁLISIS DEL ESTUDIO PREDYCES®

Resumen

Introducción: **la disfagia y la desnutrición son condiciones que con frecuencia aparecen juntas en los pacientes hospitalizados.**

Objetivos: **el objetivo principal de este estudio fue analizar la prevalencia de desnutrición en pacientes con disfagia incluidos en el estudio PREDyCES®, así como para determinar sus consecuencias clínicas y económicas.**

Métodos: **se trata de un subestudio de un estudio observacional, transversal realizado en 31 hospitales de toda España.**

Resultados: **se incluyeron 352 pacientes con disfagia. El 45,7% de los pacientes presentaron desnutrición (NRS®-2002 ≥ 3) al ingreso y el 42,2% al alta. En pacientes de edad avanzada (≥ 70 años) la prevalencia de la desnutrición fue aún mayor: 54,6% al ingreso y el 57,5% al alta. Además, la prevalencia de la desnutrición fue mayor en los ingresos urgentes frente a las programados (45,7% vs 33,3%; p <0,05) y en los ingresados en hospitales pequeños frente a los hospitales grandes (62,8% vs 43,9%; p <0,001). La estancia hospitalaria fue mayor en los pacientes desnutridos en comparación con los bien nutridos (11,5 ± 7,1 días frente a 8,8 ± 6,05 días, p <0,001). En pacientes con desnutrición también se observó una tendencia al incremento de costes relacionados, aunque no fue estadísticamente significativa (8 004 ± 5 854 € frente a 6 967 ± 5 630 €; p = 0,11). La duración de la estancia también fue más prologada en los pacientes de edad avanzada (≥ 70 y / o) vs adultos (<70 y / o). El 25% de los pacientes con disfagia y el 34,6% de los pacientes desnutridos con disfagia recibieron soporte nutricional durante la hospitalización.**

Discussion: **these results confirm that in patients with dysphagia, malnutrition is a prevalent and under recognized condition, that also relates to prolonged hospitalizations.**

(*Nutr Hosp*. 2015;32:1830-1836)

DOI:10.3305/nh.2015.32.4.9700

Key words: *Malnutrition. Dysphagia. PREDyCES®. Costs. Prevalence.*

Conclusión: **estos resultados confirman que en los pacientes con disfagia, la desnutrición es una condición frecuente y poco reconocida, que también está relacionada con la prolongación de la hospitalización.**

(*Nutr Hosp*. 2015;32:1830-1836)

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Palabras clave: *Desnutrición. Disfagia. PREDyCES®. Costes. Prevalencia.*

Abbreviations

BMI: Body mass index.
CIs: Confidence intervals.
ESPEN: European Society for Clinical Nutrition and Metabolism.
ESSD: European Society for Swallowing Disorders.
GI: Gastrointestinal.
HM: Hospital malnutrition.
LOS: Length of in-hospital stay.
MNA®: Mini Nutritional Assessment.
NRS®-2002: Nutritional Risk Screening-2002.
ORL: Otorhinolaryngology.
SD: Standard deviation.

Introduction

Dysphagia and malnutrition are two frequent clinical conditions in elderly patients[1], in stroke patients[2], in those with neurodegenerative diseases[3] and in head and neck cancer patients[4].

Between 10% and 30% of people over 65 years old present with dysphagia[5], with figures increasing up to 50-60% in people living in nursing homes[6,7] and to 70% in advanced age patients that require hospitalization after an acute disease/condition[1,8].

Between 25% and 50% of post-stroke patients[2] and over 40% of patients with head and neck tumors present with dysphagia at some stage of the disease[9,10]. In patients with neurodegenerative diseases, the prevalence of dysphagia varies according to the specific diagnosis and the degree of neurological deterioration, for example it affects more than 80% of patients with advanced Parkinson's disease[11].

In patients after a stroke and undergoing rehabilitation, malnutrition is usually related to a diminished intake of macronutrients during the days or weeks after the episode and it is interpreted as a consequence of dysphagia[2]. Nevertheless, the relation between dysphagia and malnutrition during the acute phase of a stroke or in other conditions is not so evident. Thus, Crary *et al*. observed a high prevalence of both dysphagia (52.6%) and malnutrition (26.3%) in patients with stroke in acute phase, but did not highlight any relation between both conditions[12]. On the other hand, in patients with neurodegenerative conditions, dementia and in very elderly patients, the presence of dysphagia and malnutrition could be both cause and consequence of functional decline, in a cycle in which dysphagia causes malnutrition, malnutrition contributes to functional decline, and functional decline aggravates dysphagia symptoms[8,13].

Dysphagia's most important complication is aspiration pneumonia[14-16], which is responsible for 20% to 65% of deaths in head and neck cancer patients[17], and is the most important cause of mortality in patients with neurodegenerative diseases[18]. Recent studies suggest that in very elderly patients deglutition rehabilitation could provide an improvement in nutritional status as well as a decrease in the incidence of pneumonia[19].

In the PREDyCES® study, a observational, cross-sectional, multicentric study performed with the aim to determine the prevalence of hospital malnutrition (HM) in Spain, dysphagia was observed in 20.5% of all patients analyzed and was identified as a risk factor for the development of malnutrition (3.39 [2.64-4.37]; $p < 0.001$)[20].

Objectives

The main purpose of this study is to analyze the prevalence of malnutrition at admission and discharge of all patients with dysphagia recruited in the PREDyCES® study, and to determine the clinical and economic consequences of HM in dysphagic patients.

Methods

This study evaluated the prevalence of HM in the subgroup of patients with dysphagia in the PREDyCES® study. The PREDyCES® study was an observational, cross-sectional, multicentric study conducted in 31 sites all over Spain from April to September 2009. The design, inclusion and exclusion criteria of the PREDyCES® study have been described in detail in previous publications[20,21].

The sample size was determined by the number of patients referring dysphagia at admission who participated in the PREDyCES® study. In the PREDyCES® study, the sample size was calculated from malnutrition prevalence data in previous studies conducted in Spain[20,21].

Data collections were performed at admission (in the first 48 hours after admission) and at discharge (or 28 days after admission if Length of in-hospital stay (LOS) was ≥ 28 days). Socio-demographic data, anthropometric measurements (weight, height, arm and calf circumferences) and biochemical parameters were collected at admission, and anthropometric measurements, biochemical parameters and gastrointestinal (GI) symptoms were collected at discharge.

The nutritional status of the patients was evaluated by the Nutritional Risk Screening® - 2002 tool (NRS®-2002) both at admission and at discharge. The prevalence of malnutrition (percentage of patients with dysphagia included in the PREDyCES® study with an NRS®-2002 score of ≥ 3) was determined at both admission and discharge for all patients who referred dysphagia and for subgroups of patients according to sex, age, type of admission (urgent or scheduled) and frequency of nutritional intervention. LOS was calculated by the patients' dates of admission and discharge. Hospitalization costs were calculated from the days of hospitalization and the average cost per day of admission provided by the Ministry of Health and Consumer Affairs (2009).

Severe weight loss was defined as reductions of more than 2%, 3%, 4% or 5% of patients' initial weight during hospital stays of up to 10, 20, 30 days or more than 30 days, respectively.

Statistical analysis was performed with SPSS® 15.0 for Windows (SPSS Inc., Illinois, United States). A descriptive data analysis was performed. The mean, standard deviation and 95% confidence intervals (CIs) for the mean were calculated for the continuous variables. Relative and absolute frequencies were calculated for the categorical variables. The differences between the anthropometric measurements at admission and discharge were evaluated by the Wilcoxon signed-rank test. The differences in prevalence of malnutrition according to age (< 70 vs ≥ 70), sex, type of admission (scheduled or urgent), and hospital size (small centers [<200 beds] vs large centers [>500 beds]) were evaluated by Fisher's exact tests. The differences in mean age, biochemical parameters and anthropometric measurements between patients with and without malnutrition were evaluated by t tests. In all the analyses, the statistical significance threshold was set at $p < 0.05$.

The PREDyCES® study was approved by the Hospital Universitario La Paz ethics committee and conducted following the principles of the Declaration of Helsinki and the 1996 International Conference on Harmonisation Good Clinical Practice standards. All patients granted their written informed consent to participate in the study

Results

352 patients with dysphagia were included in the analysis: 178 men and 174 women. Patients had a mean age of 69.15 ± 16.63 years and a median age (range) of 74 (18-97) years. 58.8% of all patients were ≥70 years old.

75.3% of all admissions were urgent and the remaining 24.7% scheduled. Wards with higher admissions of patients with dysphagia were internal medicine (22.4%), GI and general surgery (16.8%), orthopaedics (10.5%), otorhinolaryngology (ORL) (9.1%) and cardiology (8.8%). Adult patients (<70 y/o) were more frequently admitted to the GI and general surgery ward (17.2%), ORL (16.6%), oncology (14.5%), internal medicine (13.8%) and orthopaedics (8.3%). Elderly patients (≥70 y/o) were most frequently admitted to the internal medicine ward (28.5%), GI and general surgery (16.4%), orthopaedics (12.1%), cardiology (11.1%) and neurology (6.3%).

Mean ± standard deviation (SD) weight was 61.42 ± 15.37 Kg at admission and 60.0 Kg ± 15.40 Kg at discharge, with a mean weight loss of 1.22 Kg (95% CI: 0.62 – 1.82 Kg; p<0.001). 42.9% of patients presented a significant or severe weight loss during hospitalization.

During hospitalization patients also presented a significant body mass index (BMI) loss of -0.43 Kg/m^2 (95% CI: 0.18 -0.68 Kg/m^2; p<0.001), descending from a mean BMI of 23.14 ± 5.80 Kg/m^2 at admission to 22.65 ± 5.68 Kg/m^2 at discharge. Patients with a BMI lower than 20.5 Kg/m^2, increased from 33% at admission to 35.1% at discharge. Decrease of body weight and BMI was significantly higher in elderly patients (≥70) than in adults (p<0.001). Elderly patients showed a mean weight loss of 1.74 Kg (95% CI: 0.88 – 2.61 Kg) and mean BMI loss of 0.65 Kg/m^2 (95% CI: 0.30 – 1.00 Kg/m^2).

Prevalence of HM according to NRS®-2002 (NRS® ≥3) was similar at admission (45.6%, 150/352) and at discharge (42.2%, 136/322). Prevalence of HM increased significantly in older patients (p<0.001) (Fig. 1). 54.6% (113/207) of patients ≥70 years old, presented with malnutrition at admission and 57.5% (107/186) at discharge. In adults (<70 y/o) the prevalence of malnutrition was of 25.5% (37/145) at admission and of 21.3% (29/136) at discharge. No significant differences were observed between men and women (41.0% men vs. 44.3% women; p=0.59) but there were significant differences between urgent and scheduled visits (45.7% vs. 33.3%; p<0.05) and between small hospitals (<200 beds) and large hospitals (>500 beds) (62.8% versus 43.9%; p<0.001) (Fig. 1).

Patients with a NRS®≥3 score at admission were older (+9.8 years), had a lower body weight (-11.2 Kg), lower BMI (-3.63 Kg/m^2) as well as lower arm and calf circumferences and serum albumin than those well-nourished (p<0.001 in all parameters) (Table I).

Wards with a higher prevalence of malnourished patients were hematology (72.2%), geriatrics (66.7%), oncology (60%), internal medicine (59.5%) and neurology (47.4%).

In-hospital LOS was significantly higher in malnourished patients compared to those well-nourished

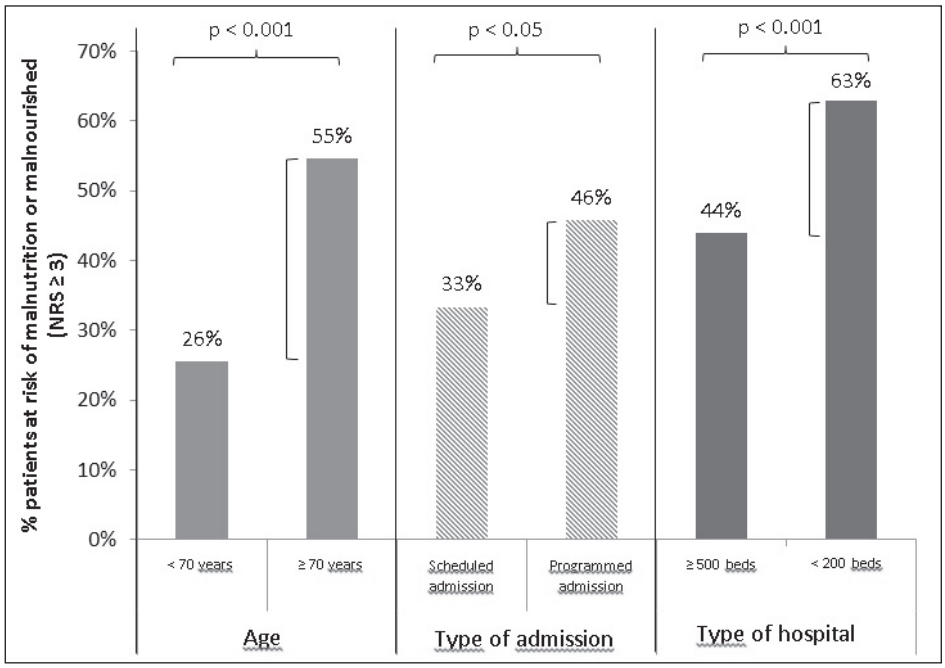

Fig. 1.—Prevalence of hospital malnutrition (NRS® ≥3) according to age, type of admission and type of hospital.

(11.53 ± 7.10 days vs. 8.80 ± 6.06 days; p<0.001). Related costs were also higher in malnourished patients (8 004 ± 5 854€ vs. 6 967 ± 5 630€; p=0.11) but the difference among groups was not statistically significant.

In adult patients both LOS (14.21 ± 8.55 days vs. 8.50 ± 6.02 days; p<0.001) and related costs (10 285 ± 7 316€ vs. 6 950.2 ± 5 894; p<0.05) were significantly higher between malnourished and well-nourished patients. Nevertheless, in elderly patients (≥70 years old) although slightly higher, differences in costs and LOS between malnourished and well-nourished patients were not statistically significant (LOS 10.80 ± 6.50 vs. 9.22 ± 6.12; p=0.093 and costs 7 386 ± 5 264 vs. 6 989 ± 5 289; p=0.613) (Fig. 2).

25.5% (82/332) of all patients included (dysphagic patients) received nutritional support, and 34.6% (47/136) of patients malnourished at discharge received nutritional support during hospitalization.

Discussion

In the hospital setting, the identification of malnourished or at risk of malnutrition patients is essential to establish an adequate nutritional support that can contribute to reduce complications, costs and in-hospital stays related to malnutrition. Nevertheless, the lack of standardization in nutritional screening, diagnostic and intervention protocols still makes of malnutrition an underdiagnosed and undertreated condition.

Our study shows that in Spain, over 40% of hospitalized patients with dysphagia are also at risk of malnutrition. The prevalence of malnutrition observed in our study is lower than the prevalence observed in other recent studies performed also in patients with dysphagia, but in which malnutrition was assessed by means of the Mini Nutritional Assessment (MNA®). These studies reported a prevalence of malnutrition close to 70%[1,8]. Differences in figures could be attributed to basal characteristics of patients included in the studies, such as mean age, which in our study was of 69.2 years, while in the studies published by Galán Sánchez-Heredero *et al.*[1] and Carrión *et al.*[8] was of 80.8 years and 85 years, respectively. Another fact supporting this thesis is that in our study the prevalence of malnutrition in patients ≥70 years old was close to 60%.

Several studies have reported that malnutrition[20,22,23] and dysphagia[24,25] have a negative impact in prognosis, in LOS as well as in the use of healthcare resources. Nevertheless, evidence regarding the impact of malnutrition in patients with dysphagia is still scarce. Carrión *et al.*[1] reported shorter survival in patients with both malnutrition and dysphagia than in patients with only one of these conditions. Our study reports higher LOS in malnourished patients with dysphagia and although not statistically significant, a trend towards higher costs, than in patients well-nourished with dysphagia.

Although our results confirm that dysphagia and malnutrition appear more frequently in older patients, they are not conditions exclusive of the elderly, and most of all, clinical and economic consequences could be more relevant in patients under 70 years old. Therefore, establishing hospital protocols for early malnutrition screening and intervention in all age patients presenting with risk factors –*being the presence of dysphagia, one of them*– is crucial.

Table I
Patients characteristics at admission according to nutritional status (NRS®-2002)

		N	*Mean*	*SD*	*95% CI*
Age, years	NRS < 3	202	64.96	11.72	(62.57-67.35)
	NRS ≥ 3	150	74.79	13.97	(72.54-77.05)
	All	352	69.15	16.63	(67.41-70.89)
Weight, Kg	NRS < 3	202	66.18	13.89	(64.25-68.11)
	NRS ≥ 3	150	55.03	14.98	(52.61-57.45)
	All	352	61.43	15.37	(59.82-63.04)
Height, cm	NRS < 3	202	164.10	9.45	(162.79-165.41)
	NRS ≥ 3	150	161.90	8.62	(160.51-163.29)
	All	352	163.20	9.16	(162.21-164.12)
BMI, Kg/m^2	NRS < 3	202	24.68	5.34	(23.94-25.42)
	NRS ≥ 3	150	21.05	5.75	(20.13-21.98)
	All	352	23.14	5.79	(22.53-23.74)
Arm circumference (cm)	NRS < 3	202	28.48	4.20	(27.90-29.07)
	NRS ≥ 3	150	26.34	4.82	(25.56-27.12)
	All	352	27.57	4.59	(27.09-28.05)
Calf circumference (cm)	NRS < 3	202	34.18	5.94	(33.36-35.36)
	NRS ≥ 3	150	31.14	4.47	(30.41-31.86)
	All	352	32.88	5.56	(32.30-33.47)
Serum albumin (g/dL)	NRS < 3	125	3.57	0.75	(3.44-3.71)
	NRS ≥ 3	95	3.23	0.69	(3.10-3.38)
	All	220	3.43	0.74	(3.33-3.53)
Lymphocytes (cells/mL)	NRS < 3	177	1 772.00	1 165.83	(1 599.33-1 945.20)
	NRS ≥ 3	136	1 370.00	1056.08	(1 191.38-1 549.57)
	All	313	1 598.00	1 135.38	(1 471.41-1 723.96)

NRS®-2002: Nutritional Risk Screening-2002. BMI: Body Mass Index. SD: standard deviation. CI: confidence interval.

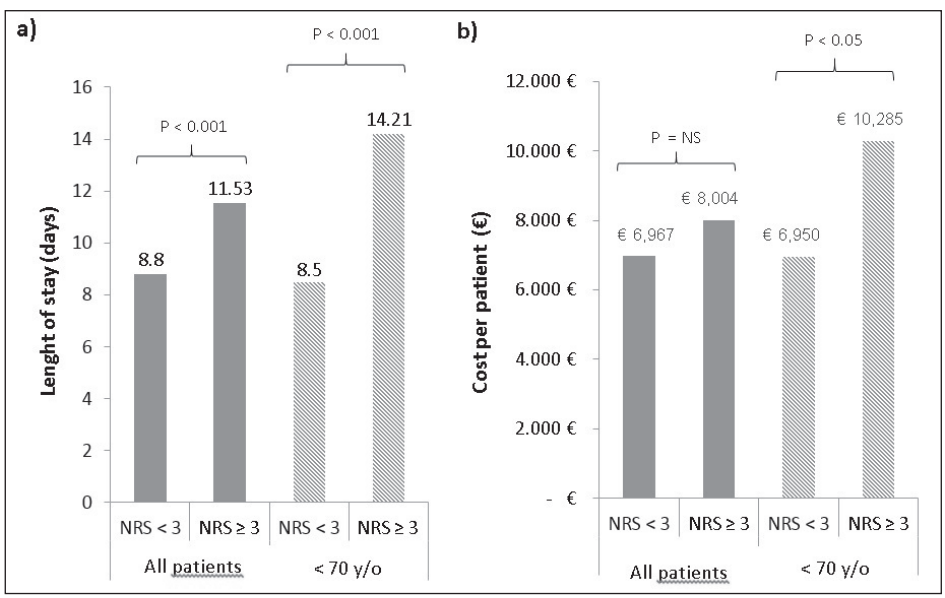

Fig. 2.—Length of stay (a) and related costs (b) according to malnutrition risk in all patients and in adult patients (<70 years old).

Regarding this last observation, we would like to highlight 3 aspects. First, the fact that in our study patients with dysphagia and ages between 18 and 97 years were included, constitutes itself a differential aspect from prior publications[1,8], showing that dysphagia is not a symptom exclusively present in advanced ages. Second, it is notable that the prevalence of malnutrition in adult patients (<70 y/o) with dysphagia is slightly higher (25.5%) than in the general population in the PREDyCES® study (23.7%)[20]. Third, the differences in LOS and related costs between malnourished and well-nourished patients were more pronounced in adults than in elderly patients. This could imply that the impact of malnutrition in patients with dysphagia is higher in younger patients.

Also in our study more than a half of patients with dysphagia hospitalized in hematology, geriatrics, oncology and internal medicine wards, as well as half of those staying in the neurology ward presented with risk of malnutrition at admission, demonstrating the relevance of implementing systematic nutritional screening in the above-mentioned wards.

The European Society for Swallowing Disorders (ESSD) recommends continuous monitoring of the nutritional status of patients with dysphagia because of the high risk of malnutrition[26]. Also, in patients who have suffered a stroke, the ESSD recommends linking the diagnosis of dysphagia to nutritional recommendations such as the adaptation of food texture[27]. In geriatric patients with dysphagia, the European Society for Clinical Nutrition and Metabolism (ESPEN) also recommends nutritional support measures[28]. In spite of all recommendations, only 1 in 4 dysphagic patients received nutritional support, and 1 in 3 patients with both dysphagia and malnutrition.

There are several limitations that should be considered when interpreting our results. First, the diagnosis of dysphagia relied on self-reports at admission as well as prior clinical records when available; patients did not undergo confirmatory explorations during the study. This could have excluded patients with mild dysphagia, unaware of the preexistent condition, as well as patients who developed symptoms during hospitalization. Second, there is lack of information on the severity of the condition or the actual cause of dysphagia, which limits our ability to compare with other studies performed in very specific populations or make comparisons according to dysphagia severity. Last, but not of less importance, the cost related to malnutrition was calculated based on duration of hospitalization, without considering the incidence or costs of complications, probably underestimating the actual figures.

Notwithstanding its limitations, this study provides valuable information regarding the prevalence and burden of malnutrition in patients with dysphagia, and confirms the need to establish nutritional screening, intervention *–if needed–* as well as follow-up programs in hospitalized patients with dysphagia.

Acknowledgments

The authors would like to thank the economic support provided by Nestlé Health Science in conducting this study and the technical support provided by Oblikue Consulting in the analysis of results and drafting of this manuscript. The authors also thank all the investigators who participated in the PREDyCES® study for their kind collaboration.

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