

Elderly Feeding and Nutrition during Hospitalization: An Integrative Review

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Abstract

Objective: to search in the current literature the elements that exert an influence on feeding and nutrition in hospitalized aged people. *Method:* the following strategies were used for the integrative review stages: research question (*Population or Patients, Exposure, Outcomes*); analysis flowchart (*Preferred Reporting Items for Systematic Reviews and Meta-analyses*); and levels of evidence corresponding to the studies (*Oxford Centre for Evidence-Based Medicine*). The searches were conducted in the *MEDLINE/PubMed, Biblioteca Virtual em Saúde, Embase, CINAHL* and *Scopus* databases. *Results:* the initial search yielded 1808 studies, of which 34 comprised the analysis *corpus* after applying the inclusion/exclusion criteria. The assessments corresponding to nutritional status and to the risk factors for hospitalized aged people are fundamental in defining the diet. An association was found between inadequate energy intake, lack of appetite, infections, malignity, *delirium* and need for assistance in feeding. Dysphagia affected nutritional status and was associated with multimorbidities, cognitive impairment, malnutrition, higher dependence for the activities of daily living, and greater care need. Nutritional support improved the perioperative nutritional status, in addition to reducing the hospitalization times and the number of infectious complications. *Conclusion:* the main disorder that hinders meeting the nutritional needs is dysphagia, and is associated with aged people's multimorbidity and dependence. The results provide geriatric and gerontological knowledge about elderly nutrition, in addition to targeting preventive and intervention treatments and care during hospitalization.

Keywords

Aged, Inpatient, Elderly Nutrition, Hospitalization

1. Introduction

Human aging is a desirable event and represents an achievement of humanity. It brings with it social chains that exert impacts on the economy, politics and especially on health. It is a progressive and gradual process that implies motor and sensory losses over time, rendering individuals more vulnerable and susceptible to the emergence of diseases that directly affect their functionality [1].

During aging, it is common for changes in body composition to occur, such as decreased muscle tissue, loss of strength and greater concentration of adipose tissue associated with malnutrition [2]. Such changes can lead older adults to require hospitalization to take care of their health/disease and extend their lives, even though it represents a high risk to their health by itself, especially when it happens for prolonged periods of time. At this moment, there is a high probability of suffering negative clinical outcomes such as incontinence, malnutrition, depression, worsening of morbidities and comorbidity, cognitive decline, deterioration of functional capacity and death [3].

In the eating process, food must be chewed, transformed into a bolus and taken to the pharynx, propelled mainly by the tongue. This process is highly complex, as it involves many muscles of the oral cavity, larynx and esophagus, and together more than 30 nerves and muscles for volitional and reflexive activities during eating [4].

Functional losses require health/illness care, and often represent, for the elderly, a trajectory of continuous demand for primary, secondary and tertiary health care services. Therefore, it is the elderly population segment (60 years of age or over) that tends to resort to hospital admissions more frequently. However, it is not pertinent to focus efforts solely on identifying and evaluating physiological factors that affect the nutrition of hospitalized elderly people. The hospital, as a necessary environment for maintaining health and life, also has intrinsic elements in its physical and operational structure that directly affect the oral feeding process of elderly people [5].

A meta-analysis involved 583,972 older adults from 24 European countries with the objective of assessing the malnutrition risk in different contexts. The malnutrition risk was 28% in hospitals, 17.5% in *home-care* and 8.5% in the community [6]. For researchers, malnutrition in hospitalized aged people is influenced by the clinical condition, poor absorption of nutrients, use of drugs or increased metabolic demand due to the pathology [7].

It is observed that the malnutrition risk is significantly higher in hospitalized aged people, which reinforces the importance of carrying out this review with a focus on this population segment. The broad and systematic identification of nutritional and dietary factors that interfere with the nutritional condition are essential for the health team, as they represent support to ensure care related to the nutritional needs of hospitalized aged people.

The search for evidence of the relationship between hospital admission, physical frailty and difficulties with oral feeding in the elderly is relevant. It is essential for the healthcare team to have studies that provide scientific evidence about

this relationship, and thus adopt more assertive directions in the practice of gerontological care in the hospital context.

In view of the above, this integrative literature review aimed at searching the current literature for the elements that exert an influence on the diet and nutrition of hospitalized aged people.

2. Method

This is an integrative literature review and, for this purpose, the methodological stages of establishing a research question, sampling or searching the literature, categorizing the studies, evaluating those included in the review, interpreting the results and presenting the review were undertaken [8].

Identification of the theme and elaboration of the research question fulfilled the first review stage. The PCC acronym was used for structuring the guiding question and elaborating the search strategy of the studies, where P = *Population or Patients* (aged people); C = *Concept* (diet, nutrition); C = *Context* (hospitalization), according to Chapter 11.2.2 of the *JBI Manual for Evidence Synthesis* [9]. Thus, the following question was structured: **“Which is the current panorama of national and international scientific production on the elements influencing elderly feeding and nutrition during hospitalization?”**

The following inclusion criteria were defined in the second review stage: targeting people aged ≥ 60 years old, considering that, in Brazil, individuals over 60 years old are considered elderly according to the Elderly Statute (Federal Law no. 10741/2003); with no limit regarding publication date and being directly related to the topic and developed in the hospital context. The exclusion criteria were as follows: materials appearing as editorials, opinion articles, dissertations, theses and review articles seeking only the inclusion of original articles.

Also, in the second stage of this review, the specific search strategy for each portal and database was elaborated. Initially, the *Medical Subject Headings* (MeSH) descriptors was used (Aged, Frailty, Frail Elderly, Inpatients, Hospitalization, Elderly Nutrition, Eating) and, subsequently, the translation for the specific descriptors accompanied by Boolean operators (AND, OR), as shown in **Table 1**.

The search strategy was applied by the main researcher in the *Medical Literature Analysis and Retrieval System Online* (MEDLINE) (PubMed Portal); *Biblioteca Virtual em Saúde* (BVS); *Embase, Cumulative Index to Nursing and Allied Health Literature* (CINAHL) and *Scopus* databases in May 2023. **Table 1** shows the search strategies.

The articles were organized in the third stage using a bibliographic reference manager. The content was summarized by defining all the information to be extracted, such as: author, year, country, journal, sample, objective, results and level of evidence [8]. In the fourth stage, the articles were critically read in order to synthesize the available information and the studies were classified according to the level of scientific evidence according to the *Oxford Centre for Evidence-Based Medicine* (2009) [10] (**Table 2**).

Table 1. Search strategies in portals and databases. Curitiba, PR, Brazil, 2023.

PORTAL/ DATABASE	DESCRIPTORS
PubMed/ MEDLINE Portal	“Aged” [Mesh] OR (Elderly) AND “Frailty” [Mesh] OR (Frailties) OR (Frailness) OR (Frailty Syndrome) OR (Debility) OR (Debilities) OR “Frail Elderly” [Mesh] OR (Elderly, Frail) OR (Frail Elders) OR (Elder, Frail) OR (Elders, Frail) OR (Frail Elder) OR (Functionally-Impaired Elderly) OR (Elderly, Functionally-Impaired) OR (Functionally Impaired Elderly) OR (Frail Older Adults) OR (Adult, Frail Older) OR (Adults, Frail Older) OR (Frail Older Adult) OR (Older Adult, Frail) OR (Older Adults, Frail) AND “Inpatients” [Mesh] OR (Inpatient) OR “Hospitalization” [Mesh] OR (Hospitalization) AND “Elderly Nutrition” [Mesh] OR (Enteral Nutrition) OR (Eating) [Mesh] OR (Parenteral Nutrition) OR (Nutrition Assessment)
BVS Portal	(Idoso) Or (Idosos) OR (Pessoa de Idade) OR (Pessoa Idosa) OR (Pessoas de Idade) OR (Pessoas Idosas) OR (Aged) OR (Anciano) OR (Idosos de 80 Anos o mais) OR (Centenários) OR (Idosos de 80 anos ou mais Anos) OR (Idosos de 80 anos ou mais) OR (Idosos de 80 Anos ou mais Anos) OR (Nonagenários) OR (Octogenários) OR (Velhíssimos) OR (Aged 80 and over) OR (Anciano de 80 o más Años) OR (Idoso Fragilizado OR (Adultos Idosos Fragilizados) OR (Idosos Debilitados) OR (Idosos Fragilizados) OR (Frail Elderly) OR (Anciano Frágil) OR (Idoso Hospitalizado) AND (Hospitais) OR (Centro Hospitalar) OR (Centros Hospitalares) OR (Hospital OR (Hospitals) OR (Hospitales) OR (Hospital) AND (Nutrição Enteral) OR (Alimentação Via Oral) AND (Nutrição do Idoso) OR (Elderly Nutrition) OR (Nutrición del Anciano)
CINAHL	TX aged AND TX hospitalized patients AND TX enteral nutrition AND TX elderly Nutrition
EMBASE	aged:ti,ab,kw AND “hospital patient”:ti,ab,kw AND “enteric feeding”:ti,ab,kw OR “elderly nutrition”:ti,ab,kw
Scopus	(TITLE-ABS-KEY (aged) AND TITLE-ABS-KEY (hospitalized AND patients) AND TITLE-ABS-KEY (enteral AND nutrition) AND TITLE-ABS-KEY (elderly AND nutrition)

Source: The authors (2023).

Table 2. Levels of evidence by type of study. Curitiba, PR, Brazil, 2023.

Evidence level	Types of studies
1 a	Systematic Review (with homogeneity) of Randomized Controlled Trial;
1 b	Individual Randomized Controlled Trial (with narrow Confidence Interval);
1 c	All or none case-series;
2 a	Systematic Review (with homogeneity) of cohort studies;
2 b	Individual cohort study (including low quality Randomized Controlled Trial; e.g., <80% follow-up);
2 c	“Outcomes” Research; Ecological studies;
3 a	Systematic Review (with homogeneity) of case-control studies;
3 b	Individual Case-Control Study;
4	Case-series (and poor quality cohort and case-control studies);
5	Expert opinion without explicit critical appraisal, or based on physiology, bench research or “first principles”.

Source: Adapted from the Oxford Center Evidence-Based Medicine classification (2009).

In the fifth stage, the results were read in full, and analyzed in accordance with the research question. In the sixth stage, the synthesis of the articles and the final considerations of this integrative review were carried out.

3. Results

The search for data resulted in 1808 studies: 705 were excluded for being dupli-

cates and 1103 were selected to read their titles and abstracts. Of these, 794 articles were excluded by reading their titles and 224 after reading their abstracts, resulting in the selection of 85 for full-reading. After this stage, 66 were excluded, making 19 with the addition of another 15 studies, which were identified after reviewing the bibliographic references of the articles selected for the review, thus resulting in the inclusion of 34 studies.

To minimize possible risks of bias in selection of the studies, the stages of reading titles and abstracts, as well as the identification of studies by reading the references, were carried out by two independent evaluators seeking 100% agreement, with a third reviewer evaluating the differences that arose. **Figure 1** shows the flowchart corresponding to the *Preferred Reporting Items for Systematic Reviews and Meta-Analysis* (PRISMA) method used to illustrate the selection of articles [11].

Table 3 shows the categorization of the articles that made up the integrative review corpus by author/year of publication, country of origin, publication journal, sample size, objective, results and level of evidence.

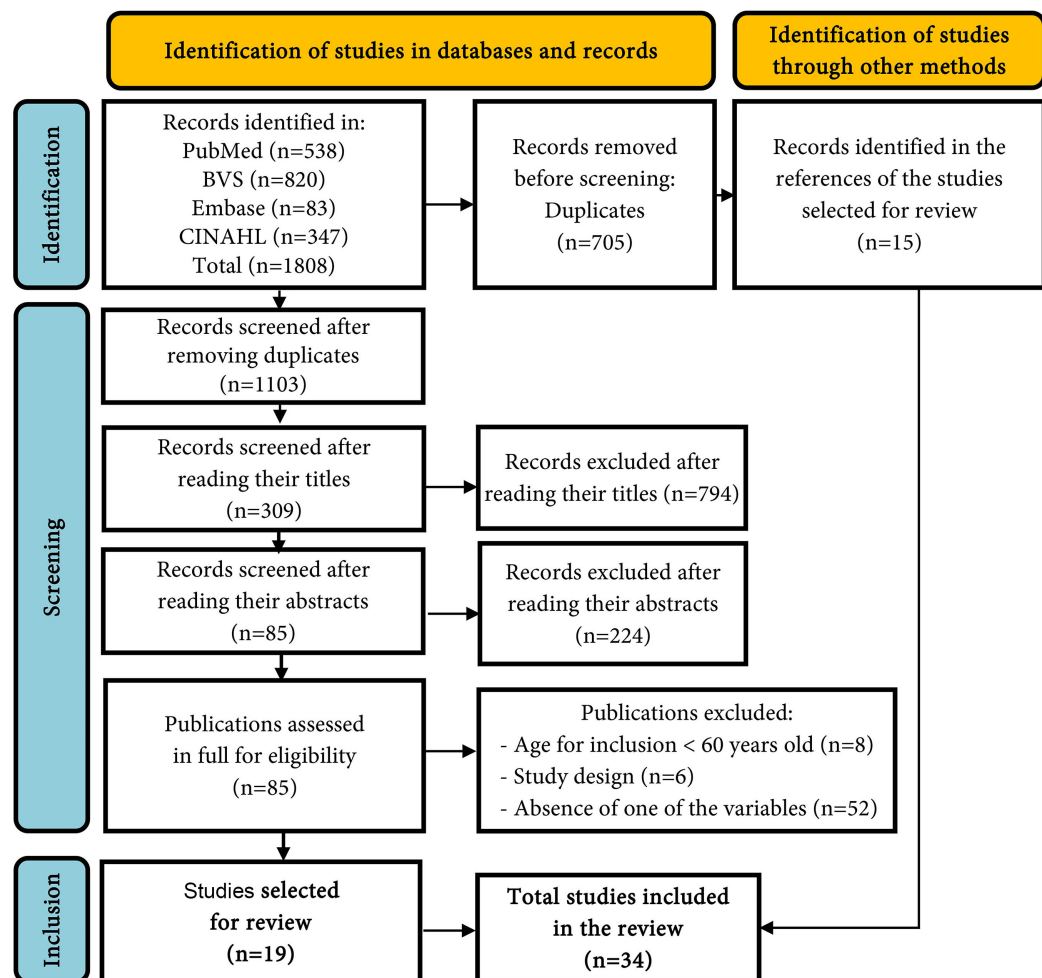


Figure 1. PRISMA flowchart corresponding to selection of the studies. Curitiba, PR, Brazil, 2023. Source: Prepared by the authors (2023), adapted from Page *et al.*, 2021.

Table 3. Characteristics of the studies that made up the integrative review corpus. Curitiba, PR, Brazil, 2023.

Author/Year	Country of origin	Journal	Sample size	Objective	Results	Level of evidence
MEIER <i>et al.</i> , 2001 [12]	USA	<i>Arch Intern Med.</i>	99	To assess the effects of feeding tubes on the survival of aged people with Advanced Dementia.	Feeding tube insertion predictors: African-American ethnicity (OR: 9.43; 95% CI: 2.1 - 43.2) Living in an ILPI (OR: 4.9; 95% CI: 1.02 - 2.5). Using a tube is not associated with greater survival ($p = 0.90$).	1B
LEBOIVITZ <i>et al.</i> , 2003 [13]	Israel	<i>Journal of Gerontology: Medical Sciences</i>	215	To analyze the oral microbiota of patients fed by means of NGT, oral route and PEG.	Prevalence: <i>Staphylococcus aureus</i> in the NGT feed was 81%, 51% in PEG and 17.5% through the oral route, $p = 0.0001$. <i>Pseudomonas aeruginosa</i> was 31% with NGT, 10% with PEG and 0% via the oral route, $p = 0.001$. <i>Klebsiella</i> and <i>Proteus</i> were isolated mainly in patients with NGT ($p = 0.003$).	2B
KAGANSKY <i>et al.</i> , 2005 [14]	Israel	<i>Am J Clin Nutr</i>	414	To identify risk factors for malnutrition and the MNA score and their subpoints as predictors of in-hospital mortality.	Risk factors for malnutrition: low albumin and phosphorus concentrations, dementia and stroke. Lower survival in malnourished individuals and those at risk of malnutrition ($p = 0.0001$). Lower MNA scores were associated with laboratory indices of malnutrition and infections, malignancy, pressure injuries, dementia, recent orthopedic surgery, and stroke.	4
RABADI <i>et al.</i> , 2008 [15]	USA	<i>Neurology</i>	116	To assess the effects of nutritional supplementation in malnourished stroke patients.	Intensive nutritional supplementation improved motor function when compared to standard supplementation ($p = 0.002$).	1A
MUDGE <i>et al.</i> , 2011 [16]	Australia	<i>Clin Nutr.</i>	134	To assess the nutritional intake of hospitalized aged people and related factors.	Factors associated with inadequate intake: Lack of appetite, high BMI, infection or cancer diagnosis, <i>delirium</i> and need for feeding assistance.	2B
KURODA; KURODA, 2012 [17]	Japan	<i>J Am Geriatr Soc</i>	55	To assess the relationship between thinness, swallowing and sarcopenic dysphagia.	Swallowing impairment was related to thinness rather than to frailty or dementia. Reduction in lean body mass, including swallowing muscles, is responsible for the association between decreased arm circumference and progressive loss of swallowing function ($p = 0.48$)	2B
BOSCH <i>et al.</i> , 2012 [18]	Spain	<i>Eur J Intern Med</i>	120	To assess mortality and prognostic factors in demented patients with AP.	The swallowing test showed aspiration in 92.6%. Patients with recurrent AP (28.3%) took thickeners more frequently (61.8% vs. 11.6%, $p = 0.0001$). Mortality was 50.8% and was associated with age and worse functional capacity malnutrition. There was an association between low albumin levels and mortality at six months (OR: 1.13; 95% CI: 1.01 - 1.26, $p = 0.03$).	2B
KOMIYA <i>et al.</i> , 2013 [19]	Japan	<i>Geriatr Gerontol Int.</i>	73	To determine the risk factors for unexpected death due to suffocation in aged people hospitalized for pneumonia.	Tube feeding after admission was associated with unexpected death due to suffocation (OR: 9.53; 95% CI: 1.03 - 88.26, $p = 0.047$).	2B

Continued

AMBAR <i>et al.</i> , 2014 [20]	Israel	<i>Clin Nutr.</i>	50	To assess the effects of optimizing nutritional intake in aged patients undergoing hip fracture surgery.	The patients with higher daily energy intake had less negative cumulative energy balance than the Intervention Group (-1229.9 ± 1763 vs. -4975.5 ± 4368 kcal, $p = 0.001$) and a lower total complication rate (27.3% vs. 64.3%, $p = 0.012$). There was a reduction in infectious complications in the Intervention Group (13.6% vs. 50%, $p = 0.008$).	
CINTRA <i>et al.</i> , 2014 [21]	Brazil	<i>J Nutr Health Aging.</i>	67	To assess the association between feeding route, survival, incidence of pneumonia and hospitalizations in aged people with Advanced Dementia.	At 3 months, 11.1% and 41.9% mortality in the oral feeding group and in the alternative feeding group, respectively ($p = 0.004$). At 6 months, mortality increased to 27.8% and 58.1% ($p = 0.012$). There was higher incidence of AP in the alternative feeding group ($p = 0.006$).	2B
MOMOSAKI <i>et al.</i> , 2015 [22]	Japan	<i>Geriatr Gerontol Int</i>	98,374	To assess the effects of dysphagia rehabilitation after AP in older adults.	Oral intake at discharge was higher in the dysphagia rehabilitation group (OR: 1.32; $p < 0.001$).	2B
LOPES <i>et al.</i> , 2015 [23]	Spain	<i>Nutr. Hosp</i>	182	To assess the factors related to in-hospital mortality in older adults with dysphagia.	Mortality was associated with age ≥ 85 years old, dysphagia, oncological disease, comorbidities, low functionality, MNA < 17 points, albumin < 3 g/dl and high doses of opioids, neuroleptics and antidepressants.	2B
POISSON <i>et al.</i> , 2016 [24]	France	<i>Gerodontology</i>	156	To assess the association between oral condition, dysphagia and malnutrition in hospitalized aged people.	48.42% malnourished patients, 31.44% reduced salivary flow, 89.30% in need of oral treatment, 10.7% candidiasis and 21.8% dysphagia was observed. There was an association between dysphagia and malnutrition ($p < 0.001$) and both were related to candidiasis ($p < 0.001$; $p < 0.01$). Dysphagia was related to salivary hypofunction ($p < 0.001$), dependence for oral self-care ($p < 0.001$) and dependence for self-feeding ($p < 0.001$).	2B
MAEDA <i>et al.</i> , 2016 [25]	Japan	<i>Clin Nutr.</i>	331	To assess the recovery of patients with AP and swallowing.	NOR patients and/or without evaluation by the speech therapist and diet guidance resulted in worse nutritional intake ($p < 0.05$), longer treatments (NOR: 13 days (95% CI: 12.04 - 13.96) and EOI group 8 days (95% CI: 7.69 - 8.31, $p < 0.001$)) and greater decline in swallowing capacity throughout treatment ($p < 0.001$).	2B
PILGRIM <i>et al.</i> , 2016 [26]	England	<i>J Nutr Health Aging.</i>	179	To assess the effects of lack of appetite on hospitalized aged women's health.	Lack of appetite was associated with increased risk of in-hospital infections (OR: 3.53; 95% CI: 1.48 - 8.41, $p = 0.004$) and increased risk of death at six months (HR: 2.29; 95% CI: 1.12 - 4.68, $p = 0.023$).	2B
ZHANG <i>et al.</i> , 2017 [27]	China	<i>Biomed Environ Sci.</i>	1343	To assess the nutritional status and measure HGS that would define malnutrition or nutritional risk in hospitalized aged people.	Nutritional risk was identified in 63.81% and malnutrition in 28.22%. HGS was associated with decreased malnutrition and nutritional risks. The HGS cutoff points were similar using different nutritional assessment scales: 24.9 kg vs. 27.5 kg (65 - 74 years old) and 20.8 kg vs. 21.0 kg (75 - 90 years old) for men and 15.2 kg vs. 17.0 kg (65 - 74 years old) and 13.5 kg vs. 14.6 kg (75 - 90 years old) for women.	2B

Continued

KURAOKA; NAKAYAMA, Japan 2017 [28]	<i>BMC Geriatr</i>	45	To explore the factors that influence PEG placement regret after 6 months.	PEG placement ($p < 0.01$) and decision conflict ($p < 0.001$) are explanatory factors for decision regret regarding PEG placement among substitute decision-makers. Dysphagia was diagnosed in 86%.	2B
MUR <i>et al.</i> , 2017 [29]	Spain <i>Semergen</i>	266	To assess the presence of dysphagia in hospitalized aged people.	Enteral nutrition was implemented in 10.9%. The mean survival was 230.8 ± 256.5 days. There were differences in 12-month survival in patients who tested positive ($p = 0.065$). The mean survival time was 711 days in patients with tubes and 61 days for patients without tubes, $p < 0.001$. In a comparison of tube types, survival was 611 days for NGT and more than 1000 days for PEG.	2B
TAKAYAMA <i>et al.</i> , 2017 [30]	Japan <i>Psychogeriatrics</i>	185	To assess survival of older adults with psychiatric disorder on enteral tubes.	The prevalence of dysphagia was 46.97%. Dysphagic patients presented longer hospitalization times (33.61 vs 13.86 days, $p < 0.001$), more in-hospital complications (68% vs 9%, $p < 0.001$), a higher mortality rate (23% vs. 0%, $p = 0.003$) and increased need for mechanical ventilation (26% vs. 0%, $p = 0.001$). Dysphagia was associated with burn size (OR: 1.24; 95% CI: 1.11 - 1.43, $p = 0.0011$), prior cognitive impairment (OR: 5.08; 95% CI: 1.37 - 24.68, $p = 0.0232$) and severe malnutrition (OR: 4.18; 95% CI: 1.27 - 15.62, $p = 0.0233$).	2B
CLAYTON <i>et al.</i> , 2018 [31]	Australia <i>Burns</i>	66	To determine the prevalence and risk factors for dysphagia in hospitalized aged people with severe burns.	The prevalence of dysphagia and malnutrition was 7.6% and 20.7%, respectively.	2B
EGLSEER <i>et al.</i> , 2018 [32]	Austria <i>J Nutr Health Aging</i>	3174	To assess the association between dysphagia, malnutrition and nutritional interventions in dysphagic aged people.	Malnutrition in dysphagic patients was 37% vs. 19.7% in non-dysphagic ones, $p < 0.001$. Dysphagic patients had a lower BMI (25 ± 4.8 vs. 26.1 ± 4.7 , $p = 0.01$), multimorbidities (3 ± 1.9 vs. 2.7 ± 1.7 , $p = 0.003$), and greater dependence for ADLs (78% vs. 51%, $p < 0.001$) and for care (44.2 vs. 11.7, $p < 0.001$).	2B
APPEL-DA SILVA <i>et al.</i> , 2019 [33]	Brazil <i>Nutr Hosp</i>	133	To profile older adults with PEG in a hospital from southern Brazil.	The main indication was dementia, followed by stroke. Malnutrition was observed in 68.4% and procedure-related complications, in 23.0%.	2B
KATAGIRI <i>et al.</i> , 2019 [34]	Japan <i>Front Cell Infect Microbiol</i>	8	To assess the composition of oral/intestinal microbial communities upon oral intake resumption.	Oral food intake in patients with subacute stroke and dysphagia increases diversity and composition of the oral and intestinal microbiome and were drastically different.	2C
LIN <i>et al.</i> , 2019 [35]	China <i>PLoS One</i>	745	To assess the impacts of nutritional support on hospitalized aged people.	Nutritional support reduces hospitalization time in patients at nutritional and malnutrition risk ($p < 0.05$). Patients who received nutritional support had lower incidence of infections, $p < 0.05$.	2B
HE <i>et al.</i> , 2019 [36]	China <i>J Orthop Surg Res.</i>	306	To investigate the effects of oral nutritional supplementation after hip arthroplasty in aged patients with hypoalbuminemia.	Patients with nutritional supplementation had less wound effusion (OR: 0.57; 95% CI: 0.36 - 0.91, $p < 0.05$), a lower surgical site infection rate (OR: 0.40; 95% CI: 0.17 - 0.91, $p < 0.05$), fewer joint infections (OR: 0.26; 95% CI: 0.08 - 0.79, $p < 0.05$) and fewer readmissions (OR: 0.22; 95% CI: 0.06 - 0.79, $p < 0.05$).	2B

Continued

CASTANON <i>et al.</i> , 2020 [37]	USA	<i>J Burn Care Res</i>	324	To assess the impact of early enteral nutrition in patients with thermal burns and wound healing.	The early enteral nutrition group had lower rates of infectious complications (7.8% vs. 16.7%; $p = 0.040$), mortality (15.6% vs. 26.1%; $p = 0.044$), hospitalization time (17 days vs. 20 days; $p = 0.042$) and ICU stay (13 days vs. 17 days; $p = 0.042$).	2B
TRAN <i>et al.</i> , 2020 [38]	Vietnam	<i>J Nutr Sci Vitaminol</i>	1007	To investigate the nutritional status and dietary practices of hospitalized dysphagic aged people.	There were 29% malnourished and 54% at risk of malnutrition. Nearly 78% of the dysphagic older adults had oral food intake and 22% by tube. Almost all dysphagic patients had their food intake reduced in the last 3 months. 19.1% of the older adults in the wards evolved to death, BMI 25.2 ± 4.4 and age 74 ± 15 , polymorbidity (≥ 1) 81.9%.	2B
FORMISANO <i>et al.</i> , 2020 [39]	Italy	<i>Nutrition</i>	94	To develop a protocol for the nutritional management of patients with COVID-19.	Of these patients 37.2% received basic diet; 9.6% oral nutritional supplementation; 19.1% basic diet and oral supplementation; 7.4% enteral nutrition, 5.3% parenteral nutrition; 7.4% basic diet, oral supplementation and parenteral nutrition and 13.8% a personalized diet. Nutritional risk was observed in 50.3%. Of them, 58.9% received nutritional support. Malnutrition reached 36%.	2C
LAI <i>et al.</i> , 2020 [40]	China	<i>Eur J Clin Nutr</i>	358	To investigate nutritional risk, malnutrition and nutritional support status in long-lived older adults and develop a nutritional intervention plan.	Age ($p < 0.001$), living conditions ($p = 0.009$), number of chronic diseases ($p < 0.001$), attention to nutritional knowledge ($p = 0.007$) and ADLs ($p < 0.001$) were nutritional risk factors in the older adults. HGS was similar after 3 months with a mean variation of 0.42 kg (95% CI: 2.52 - 3.36, $p = 0.78$).	2B
OLSEN <i>et al.</i> , 2021 [41]	Norway	<i>Eur Geriatr Med.</i>	85	To assess the effects of two feedback protocols on hand grip strength, mortality and feedback syndrome.	There was no difference in mortality (39% vs. 34.1%, $p = 0.64$). The Intervention Group had greater respiratory distress (53.6% vs. 30.2%, $p = 0.029$).	1B
SUZUKI <i>et al.</i> , 2022 [42]	Japan	<i>J Neurol Sci.</i>	118	To assess the reduction in the enteral nutrition administration time in acute stroke with dysphagia.	There were no significant differences in the frequency of diarrhea (42% vs. 42%, $p = 1$), vomiting (0% vs. 7%, $p = 0.29$) or pneumonia (15% vs. 7%, $p = 0.41$).	2B
ZHAO <i>et al.</i> , 2022 [43]	China	<i>Lancet Neurol.</i>	315	To compare the efficacy and safety of enteral feeding strategies in patients with severe stroke.	Poor results did not differ (82% modified complete EN vs. 80% complete EN (OR: 0.87; 95% CI: 0.41 - 1.86, $p = 0.721$); hypocaloric EN vs. 80% complete EN (OR: 0.61; 95% CI: 0.30-1.27, $p = 0.186$); hypocaloric EN vs. Modified complete EN (OR: 0.70; 95% CI: 0.34 - 1.46, $p = 0.340$). 90-day mortality due to hypocaloric EN was higher than for modified complete EN 34% vs. 17% (OR: 2.89; 95% CI: 1.46 - 5.72, $p = 0.0023$), and less significant between hypocaloric EN and complete EN: 23% (OR: 1.92; 95% CI: 1.00 - 3.69, $p = 0.049$). Hemoglobin, transferrin, prealbumin and albumin in the TPN group were lower than in EEN ($p < 0.01$). The immunoglobulin indices (IgG, IgM and IgA) were lower in TPN, and the T-lymphocyte subpopulations (CD4, CD8 and CD4/CD8) showed that the immune system in the EEN group was higher, $p < 0.01$.	1A
CHEN <i>et al.</i> , 2022 [44]	China	<i>Comput Math Methods Med</i>	300	To assess the effect of nutritional supports on nutritional status, immune function, intestinal motility and complications in gastrointestinal tumors.	Intestinal peristalsis, the time of the first defecation in the EEN group was shorter than in the TPN group ($p < 0.01$) during the perioperative period.	2B

Continued

YUEN <i>et al.</i> , 2022 [45]	China	<i>J Am Med Dir Assoc.</i>	764	To compare survival, pneumonia risk and outcomes in hospitalized aged people with Alzheimer's dementia fed by means of NGT and CMF.	Behavioral feeding problems were observed in 33%, dysphagia in 50%, or both in 17%. There was no difference in the survival rate between the NGT and CMF groups (36% vs. 37%, $p = 0.71$). The pneumonia rate was lower in the CMF group (48% vs. 60%, $p = 0.004$). NGT use was a risk factor for pneumonia (OR: 1.41; 95% CI: 1.08 - 1.85).	2B
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ILPI: *Instituição de Longa Permanência para Idosos* (Long-stay Institution for Older Adults); NGT: Nasogastric Tube; PEG: Percutaneous Endoscopic Gastrostomy; MNA: Mini Nutritional Assessment BMI: Body Mass Index; AO: Aspiration Pneumonia; Kcal: kilocalorie; NOR: Nothing via Oral Route; EOI: Early Oral Intake; HGS: Hand Grip Strength; ICU: Intensive Care Unit; ADLs: Activities of Daily Living; EN: Enteral Nutrition; TPN: Total Parenteral Nutrition; EEN: Early Enteral Nutrition; CMF: Careful Manual Feeding. Source: The authors (2023).

Among the 34 studies analyzed, there was predominance of publications from 2022 ($n = 5$; 14.70%), followed by 2017 and 2020 ($n = 4$; 11.76% each year), 2016 and 2019 ($n = 3$; 8.82% each year), then by 2012, 2014, 2015 and 2018 ($n = 2$; 5.88% each year), and 2001, 2003, 2005, 2008, 2011, 2013 and 2021 in a smaller percentage ($n = 1$; 2.94% each year). The materials were published in 28 different journals, with predominance in the *Journal of Nutrition Health Aging and Clin Nutr* ($n = 3$; 8.82%).

The following stand out among the countries in which the studies were conducted: Japan ($n = 8$; 23.53%), China ($n = 7$; 20.59%), Spain, United States of America (USA) and Israel ($n = 3$; 8.82% each) followed by Australia and Brazil ($n = 2$; 5.88% each) and Austria, Italy, France, England, Norway and Vietnam ($n = 1$; 2.94% each). Regarding the language of the articles, the majority were published in English ($n = 32$; 94.11%), followed by Spanish ($n = 2$; 5.89%).

Several studies included the assessment of nutritional intake and/or nutritional status of hospitalized aged people as a central topic [16] as well as nutritional assessment and risk factors for malnutrition [14], assessment of nutritional intake in longer-lived older adults [40], assessment of nutritional status and use of handgrip strength as a marker of nutritional risk [27], in addition to assessing the effects of poor appetite on the health outcomes [26].

It was observed that the nutritional condition of hospitalized aged people can be influenced by clinical conditions such as advanced dementia [12] [21] [45], Alzheimer's dementia with pneumonic symptoms [18], pneumonia [19] [25], gastrointestinal tumors [44], hip fracture [20] [36], psychiatric disorder [30], COVID-19 [39], subacute stroke and oral and intestinal microbiome [34].

According to the Oxford scale, there was predominance of level of scientific evidence 2B in the studies ($n = 26$, 76.47%), followed by 1A, 1B and 2C ($n = 2$; 5.88%) and by 1C and 4 ($n = 1$, 2.94%).

4. Discussion

The main problem listed in relation to the dietary issues was dysphagia, with

studies involving clinical assessment [29], dysphagia in sarcopenics [17], effects of rehabilitation in dysphagic patients [25], effects of dysphagia rehabilitation in infectious conditions [22], assessment of dysphagia and nutritional status [38], assessment of risk factors for death in the hospital environment [23], assessment of the association of dysphagia, oral status and malnutrition [24] and assessment and risk factors for dysphagia in burns [31].

Nutritional issues involving more than one clinical condition such as dysphagia and burns [31] or clinical conditions with nutritional interventions such as assessment of burns and early introduction of dietary supplementation [37] and acute stroke with nutritional interventions [42] [43] were also highlighted.

The assessment of nutritional status, particularly the importance of nutritional level and risk, for hospitalized aged people, was highlighted as predictors of unfavorable outcomes during hospitalization [16]. Malnourished patients and those at risk of malnutrition present lower survival rates ($p = 0.001$). Lower MNA scores were associated with laboratory markers of malnutrition and were lower in patients with infections, malignancy, pressure injuries, dementia, recent orthopedic surgery and stroke [14]. The nutritional risk factors in older adults are age ($p < 0.001$), living conditions ($p = 0.009$), number of CNCs ($p < 0.001$), nutritional knowledge ($p = 0.007$) and difficulties in ADLs ($p < 0.001$) [40].

Nutritional status can be assessed by handgrip strength in hospitalized patients [27]. Nutritional support guided by repeated energy balance measurements leads to better outcomes after hip fracture surgery, as there is a lower cumulative energy balance (-1229.9 ± 1763 versus -4975.5 ± 4368 kcal, $p = 0.001$) and a lower total complication rate (27.3% versus 64.3%, $p = 0.012$) [20]. The patients subjected to hip arthroplasty who had hypoalbuminemia and received dietary supplements had less wound effusion (OR: 0.57; 95% CI: 0.36 - 0.91, $p < 0.05$), a lower rate of surgical site infections (OR: 0.40; 95% CI: 0.17 - 0.91, $p < 0.05$), fewer periprosthetic joint infections (OR: 0.26; 95% CI: 0.08 - 0.79, $p < 0.05$) and fewer 30-day readmissions (OR: 0.22; 95% CI: 0.06 - 0.79, $p < 0.05$) [36].

The evaluation of the nutritional supplementation effects has been the subject of several studies, with different clinical profiles and methodological designs. The nutritional supplementation effects were evaluated in burn patients [37], in feedback protocols [41] [43], in reducing the enteral diet administration time in aged people with acute stroke [42], in aged patients in general [35], in malnourished patients [15], in aged people with gastrointestinal tumors [44], in older adults aged at least 80 years old [40], in hip surgery patients [20] and in cases of hip arthroplasty with hypoalbuminemia [36].

Inadequate energy intake is associated with lack of appetite (OR: 1.85; 95% CI: 1.42 - 2.06), high BMI (OR: 1.70; 95% CI: 1.40 - 1.81), diagnosis of infection (OR: 1.70; 95% CI: 1.14 - 1.94), malignancy (OR: 1.79; 95% CI: 1.06 - 2.00), *delirium* (OR: 1.62; 95% CI: 1.01 - 1.74) and need for assistance with feeding (OR: 1.45; 95% CI: 0.95 - 1.72) [16]. In turn, lack of appetite was associated with in-

creased risk of in-hospital infections (OR: 3.53; 95% CI: 1.48 - 8.41, $p = 0.004$) and increased risk of death at six months (HR: 2.29; 95% CI: 1.12 - 4.68, $p = 0.023$) [26].

Nutritional support reduces hospitalization time and the incidence of infectious complications in patients at nutritional risk [35] and increases the possibility of hospital discharge [15]. Rapid enteral nutrition administration can be used safely and has the potential to decrease the time required for feeding in acute stroke cases with severe dysphagia [42]. Hypocaloric enteral nutrition presented higher mortality at 90 days when compared to modified complete enteral nutrition (with prokinetic agents), with 34% versus 17% (OR: 2.89; 95% CI: 1.46 - 5.72; $p = 0.0023$), whereas the difference was less significant between hypocaloric enteral nutrition and complete enteral nutrition: 23% (OR: 1.92; 95% CI: 1.00 - 3.69; $p = 0.049$) [43]. Enteral nutrition support can improve nutritional status, even in the perioperative period of aged patients with gastrointestinal tumors, improving immune function and promoting intestinal peristalsis [44].

Half of the hospitalized older adults aged at least 80 years old are at nutritional risk. Mortality was associated with age ≥ 85 years old, previous diagnosis of dysphagia, having an oncological disease, comorbidities, low functionality prior to hospitalization, MNA < 17 points, albumin < 3 g/dl, and treatment with opioids, neuroleptics or early antidepressant [23].

Difficulty eating is an important factor responsible for poor nutrition in hospitalized aged people. In hospitalized aged people affected by dementia, especially in the advanced stage, with *Functional Assessment Staging* (FAST) of at least 7A, 46.3% use the alternative feeding route. Three-month mortality in such cases was 11.1% in the oral feeding group and 41.9% in the alternative feeding group ($p = 0.004$), increasing to 27.8% and 58.1% at 6 months ($p = 0.012$). Higher incidence of Aspiration Pneumonia (AP) was observed in the alternative feeding group ($p = 0.006$), although there was no difference in the number of hospitalizations between the groups ($p = 0.365$) [21].

Patients with recurrent aspiration pneumonia take thickeners more frequently (61.8% versus 11.6%, $p = 0.0001$). Mortality in these patients was associated with increased age, worse functional capacity and laboratory data indicating malnutrition. Lower albumin levels were associated with higher six-month mortality (OR: 1.13; 95% CI: 1.01 - 1.26, $p = 0.03$) [18].

The pneumonia rate is higher in dysphagic patients. Oral intake of a modified texture diet should be a prioritized method, rather than tube feeding or soft/regular food options for dysphagic patients [38]. Patients undergoing dysphagia rehabilitation had a higher proportion of oral intake at discharge (OR: 1.32; $p < 0.001$). Patients with mild pneumonia had a higher Odds Ratio for total oral intake associated with dysphagia rehabilitation than those with moderate and severe pneumonia (OR: 2.27; $p < 0.001$) [22]. Dysphagia assessment upon admission can help define more appropriate care [23].

The main disorder listed in relation to the factors that affect feeding was dys-

phagia [29]. There is a strong association between dysphagia and malnutrition, multimorbidities, cognitive impairment, greater dependence on ADLs and greater need for care [32]. There was a relationship between dysphagia and salivary hypofunction ($p < 0.001$), loss of posterior occlusive pairs ($p = 0.014$), dependence for oral self-care ($p < 0.001$) and dependence for self-feeding ($p < 0.001$) [24]. Oral food intake increases diversity and composition of the oral and intestinal microbiome [34]. Swallowing impairment was related to thinness and not to general frailty or presence of dementia [17].

Dysphagia in severe burns occurs in half of the hospitalized aged people. Dysphagic patients had longer duration of feeding (9.32 days versus 0, $p < 0.001$), longer hospitalization times (33.61 versus 13.86 days, $p < 0.001$), more severe in-hospital complications (68% versus 9%, $p < 0.001$), higher mortality (23% versus 0%, $p = 0.003$) and greater need for mechanical ventilation (26% versus 0%, $p = 0.001$). Dysphagia was associated with burn size (OR: 1.24; 95% CI: 1.11 - 1.43, $p = 0.0011$), prior cognitive impairment (OR: 5.08; 95% CI: 1.37 - 24.68, $p = 0.0232$) and severe malnutrition (OR: 4.18; 95% CI: 1.27 - 15.62, $p = 0.0233$) (31). Introducing early diet in burn patients reduces the risks of sepsis by 27% (OR: 0.73; 95% CI: 0.64 - 0.79, $p = 0.03$), of superficial skin infection by 21% (OR: 0.79; 95% CI: 0.61 - 0.84, $p = 0.01$), of pneumonia by 15% (OR: 0.85; 95% CI: 0.77 - 0.92, $p = 0.01$) and of death by 18% (OR: 0.82; 95% CI: 0.66 - 0.98, $p = 0.04$) [37].

The predictors for feeding tube placement included African-American ethnicity (OR: 9.43; 95% CI: 2.1 - 43.2) and living in an ILPI (OR: 4.9; 95% CI: 1.02 - 2.50). The infection at admission diagnosis is associated with higher mortality (OR: 1.9; 95% CI: 1.01 - 3.60) [12]. Using a Nasogastric Tube (NGT) was a risk factor for pneumonia (OR: 1.41; 95% CI: 1.08 - 1.85) [45] and for unexpected death due to suffocation (OR: 9.53; 95% CI: 1.03 - 88.26, $p = 0.047$) [19]. Patients who did not receive an oral diet for up to 48 hours and/or did not have a speech therapy evaluation had lower nutritional intake during hospitalization ($p < 0.05$) and longer duration of treatment (13 days; 95% CI: 12.04 - 13.96) [25].

Percutaneous endoscopic gastrostomy was the topic of studies that included the profile of the patients subjected to this procedure [33], the risk factors that influence regret to perform the procedure [28] and the evaluation of the patients' microbiota when subjected to different alternative feeding routes [13].

The main indication for percutaneous endoscopic gastrostomy was dementia, followed by stroke. Malnutrition was observed in 68% at the time of indication. Mortality of the severely malnourished group was 26.4% and 9.5% without malnutrition, with suspicion or malnutrition, $p = 0.04$ [33]. Even more unfavorable to an adequate diet for hospitalized aged people was pathogenic colonization of the oropharynx in patients on tube-enteral feeding [13].

This integrative literature review presents the following strengths: the comprehensive search strategy; evaluation of the level of evidence of the studies included; and the standardized data extraction process. As limitations, it can be mentioned that more than half of the studies included in this review were pub-

lished more than five years ago.

5. Conclusions

The integrative review showed an association between inadequate energy intake and lack of appetite, infections, malignancy, *delirium* and need for feeding assistance. Assessments of nutritional status and risk factors for hospitalized aged people are fundamental in determining the diet. Nutritional support improved the perioperative nutritional status, in addition to reducing the hospitalization times and the number of infectious complications.

Dysphagia affected nutritional status and was associated with multimorbidities, cognitive impairment, malnutrition, higher dependence for the activities of daily living, and greater care need. The factors evidenced provide geriatric and gerontological knowledge in the face of inadequate intake in hospitalized aged people and guidance for preventive and intervention treatments and care during hospitalization.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

References

- [1] Pan American Health Organization (2022) Década do Envelhecimento Saudável: Relatório de Linha de Base. Resumo. <https://iris.paho.org/handle/10665.2/56991>
- [2] Rosa, A.C.S., Roque, J.R. and Gonçalves, D.R. (2020) Estado nutricional de idosos residentes em instituição geriátrica e a relação com o consumo alimentar. *Revista Contexto & Saúde*, **20**, 25-35. <https://www.revistas.unijui.edu.br/index.php/contextoesaude/article/view/11211> <https://doi.org/10.21527/2176-7114.2020.41.25-35>
- [3] Vallejo Maroto, I., Cubo Romano, P., Mafé Nogueroles, M.C., Matesanz-Fernández, M., Pérez-Belmonte, L.M., Said Criado, I., *et al.* (2021) Recommendations on the Comprehensive, Multidimensional Assessment of Hospitalized Elderly People. Position of the Spanish Society of Internal Medicine. *Revista Clínica Española*, **221**, 347-358. <https://linkinghub.elsevier.com/retrieve/pii/S2254887421000680> <https://doi.org/10.1016/j.rceng.2020.10.007>
- [4] Matsuo, K. and Palmer, J.B. (2008) Anatomy and Physiology of Feeding and Swallowing: Normal and Abnormal. *Physical Medicine and Rehabilitation Clinics of North America*, **19**, 691-707. <https://linkinghub.elsevier.com/retrieve/pii/S1047965108000442> <https://doi.org/10.1016/j.pmr.2008.06.001>
- [5] Godoy, A.M., Lopes, D.A. and Garcia, R.W.D. (2007) Transformações socioculturais da alimentação hospitalar. *Hist cienc saude-Manguinhos*, **14**, 1197-1215. http://www.scielo.br/scielo.php?script=sci_arttext&pid=S0104-59702007000400006&lng=pt&tlng=pt <https://doi.org/10.1590/S0104-59702007000400006>
- [6] Leij-Halfwerk, S., Verwijs, M.H., Van Houdt, S., Borkent, J.W., Guaitoli, P.R., Pel-

- grim, T., *et al.* (2019) Prevalence of Protein-Energy Malnutrition Risk in European Older Adults in Community, Residential and Hospital Settings, according to 22 Malnutrition Screening Tools Validated for Use in Adults ≥ 65 Years. *Maturitas*, **126**, 80-89. <https://linkinghub.elsevier.com/retrieve/pii/S0378512219301148>
<https://doi.org/10.1016/j.maturitas.2019.05.006>
- [7] Correia, M.I.T.D., Perman, M.I. and Waitzberg, D.L. (2017) Hospital Malnutrition in Latin America: A Systematic Review. *Clinical Nutrition*, **36**, 958-967. <https://linkinghub.elsevier.com/retrieve/pii/S0261561416301601>
<https://doi.org/10.1016/j.clnu.2016.06.025>
- [8] Mendes, K.D.S., Silveira, R.C.D.C.P. and Galvão, C.M. (2019) Use of the Bibliographic Reference Manager in the Selection of Primary Studies in Integrative Reviews. *Texto & Contexto—Enfermagem*, **28**, e20170204. http://www.scielo.br/scielo.php?script=sci_arttext&pid=S0104-07072019000100602&tlng=en
<https://doi.org/10.1590/1980-265x-tce-2017-0204>
- [9] Aromatis, E. and Munn, Z. (2020) JBI Manual for Evidence Synthesis. <https://jbi-global-wiki.refined.site/space/MANUAL>
- [10] Center for Evidence-Based Medicina. (2009) Oxford Centre for Evidence-Based Medicine: Levels of Evidence (March 2009). Nuffield Department of Primary Care Health Sciences. <https://www.cebm.ox.ac.uk/resources/levels-of-evidence/oxford-centre-for-evidence-based-medicine-levels-of-evidence-march-2009>
- [11] Page, M.J., McKenzie, J.E., Bossuyt, P.M., Boutron, I., Hoffmann, T.C., Mulrow, C.D., *et al.* (2021) The PRISMA 2020 Statement: An Updated Guideline for Reporting Systematic Reviews. *BMJ*, **372**, n71. <https://www.bmj.com/content/372/bmj.n71>
<https://doi.org/10.1136/bmj.n71>
- [12] Meier, D.E., Ahronheim, J.C., Morris, J., Baskin-Lyons, S. and Morrison, R.S. (2001) High Short-Term Mortality in Hospitalized Patients with Advanced Dementia: Lack of Benefit of Tube Feeding. *The Archives of Internal Medicine*, **161**, 594-599. <http://archinte.jamanetwork.com/article.aspx?doi=10.1001/archinte.161.4.594>
<https://doi.org/10.1001/archinte.161.4.594>
- [13] Leibovitz, A., Plotnikov, G., Habet, B., Rosenberg, M. and Segal, R. (2003) Pathogenic Colonization of Oral Flora in Frail Elderly Patients Fed by Nasogastric Tube or Percutaneous Entero gastric Tube. *The Journals of Gerontology Series A: Biological Sciences and Medical Sciences*, **58**, M52-M55. <https://academic.oup.com/biomedgerontology/article-lookup/doi/10.1093/gerona/58.1.M52>
<https://doi.org/10.1093/gerona/58.1.M52>
- [14] Kagansky, N., Berner, Y., Koren-Morag, N., Perelman, L., Knobler, H. and Levy, S. (2005) Poor Nutritional Habits Are Predictors of Poor Outcome in Very Old Hospitalized Patients. *The American Journal of Clinical Nutrition*, **82**, 784-791. <https://linkinghub.elsevier.com/retrieve/pii/S0002916523296380>
<https://doi.org/10.1093/ajcn/82.4.784>
- [15] Rabadi, M.H., Coar, P.L., Lukin, M., Lesser, M. and Blass, J.P. (2008) Intensive Nutritional Supplements Can Improve Outcomes in Stroke Rehabilitation. *Neurology*, **71**, 1856-1561. <https://www.neurology.org/lookup/doi/10.1212/01.wnl.0000327092.39422.3c>
<https://doi.org/10.1212/01.wnl.0000327092.39422.3c>
- [16] Mudge, A.M., Ross, L.J., Young, A.M., Isenring, E.A. and Banks, M.D. (2011) Help-

- ing Understand Nutritional Gaps in the Elderly (HUNGER): A Prospective Study of Patient Factors Associated with Inadequate Nutritional Intake in Older Medical Inpatients. *Clinical Nutrition*, **30**, 320-325.
<https://linkinghub.elsevier.com/retrieve/pii/S0261561410002190>
<https://doi.org/10.1016/j.clnu.2010.12.007>
- [17] Kuroda, Y. and Kuroda, R. (2012) Relationship between Thinness and Swallowing Function in Japanese Older Adults: Implications for Sarcopenic Dysphagia. *Journal of the American Geriatrics Society*, **60**, 1785-1786.
<https://onlinelibrary.wiley.com/doi/10.1111/j.1532-5415.2012.04123.x>
<https://doi.org/10.1111/j.1532-5415.2012.04123.x>
- [18] Bosch, X., Formiga, F., Cuerpo, S., Torres, B., Rosón, B. and López-Soto, A. (2012) Aspiration Pneumonia in Old Patients with Dementia. Prognostic Factors of Mortality. *European Journal of Internal Medicine*, **23**, 720-726.
<https://linkinghub.elsevier.com/retrieve/pii/S0953620512002099>
<https://doi.org/10.1016/j.ejim.2012.08.006>
- [19] Komiya, K., Ishii, H., Okabe, E., Iwashita, T., Miyajima, H., Tsubone, T., *et al.* (2013) Risk Factors for Unexpected Death from Suffocation in Elderly Patients Hospitalized for Pneumonia: Unexpected Death from Suffocation. *Geriatrics & Gerontology International*, **13**, 388-392.
<https://onlinelibrary.wiley.com/doi/10.1111/j.1447-0594.2012.00912.x>
<https://doi.org/10.1111/j.1447-0594.2012.00912.x>
- [20] Anbar, R., Beloosesky, Y., Cohen, J., Madar, Z., Weiss, A., Theilla, M., *et al.* (2014) Tight Calorie Control in Geriatric Patients following Hip Fracture Decreases Complications: A Randomized, Controlled Study. *Clinical Nutrition*, **33**, 23-28.
<https://linkinghub.elsevier.com/retrieve/pii/S0261561413000836>
<https://doi.org/10.1016/j.clnu.2013.03.005>
- [21] Cintra, M.T.G., De Rezende, N.A., De Moraes, E.N., Cunha, L.C.M. and Da Gama Torres, H.O. (2014) A Comparison of Survival, Pneumonia, and Hospitalization in Patients with Advanced Dementia and Dysphagia Receiving Either Oral or Enteral Nutrition. *The Journal of Nutrition, Health & Aging*, **18**, 894-899.
<http://link.springer.com/10.1007/s12603-014-0487-3>
<https://doi.org/10.1007/s12603-014-0487-3>
- [22] Momosaki, R., Yasunaga, H., Matsui, H., Horiguchi, H., Fushimi, K. and Abo, M. (2015) Effect of Dysphagia Rehabilitation on Oral Intake in Elderly Patients with Aspiration Pneumonia: Dysphagia Rehabilitation in Aspiration Pneumonia. *Geriatrics & Gerontology International*, **15**, 694-699.
<https://onlinelibrary.wiley.com/doi/10.1111/ggi.12333>
<https://doi.org/10.1111/ggi.12333>
- [23] Ferrero López, M.I. (2015) Los factores relacionados con la mortalidad en pacientes con disfagia. *Nutricion Hospitalaria*, **31**, 820-828.
- [24] Poisson, P., Laffond, T., Campos, S., Dupuis, V. and Bourdel-Marchasson, I. (2016) Relationships between Oral Health, Dysphagia and Undernutrition in Hospitalised Elderly Patients. *Gerodontology*, **33**, 161-168.
<https://onlinelibrary.wiley.com/doi/10.1111/ger.12123>
<https://doi.org/10.1111/ger.12123>
- [25] Maeda, K., Koga, T. and Akagi, J. (2016) Tentative *nil per os* Leads to Poor Outcomes in Older Adults with Aspiration Pneumonia. *Clinical Nutrition*, **35**, 1147-1152. <https://linkinghub.elsevier.com/retrieve/pii/S0261561415002459>
<https://doi.org/10.1016/j.clnu.2015.09.011>
- [26] Pilgrim, A.L., Baylis, D., Jameson, K.A., Cooper, C., Sayer, A.A., Robinson, S.M., *et*

- al.* (2016) Measuring Appetite with the Simplified Nutritional Appetite Questionnaire Identifies Hospitalised Older People at Risk of Worse Health Outcomes. *The Journal of Nutrition, Health & Aging*, **20**, 3-7.
<http://link.springer.com/10.1007/s12603-016-0668-3>
<https://doi.org/10.1007/s12603-016-0668-3>
- [27] Zhang, X.S., Liu, Y.H., Zhang, Y., Xu, Q., Yu, X.M., Yang, X.Y., *et al.* (2017) Handgrip Strength as a Predictor of Nutritional Status in Chinese Elderly Inpatients at Hospital Admission. *Biomedical and Environmental Sciences*, **30**, 802-810.
<https://www.besjournal.com/en/article/doi/10.3967/bes2017.108>
- [28] Kuraoka, Y. and Nakayama, K. (2017) Factors Influencing Decision Regret Regarding Placement of a PEG among Substitute Decision-Makers of Older Persons in Japan: A Prospective Study. *BMC Geriatrics*, **17**, Article No. 134.
<http://bmccgeriatr.biomedcentral.com/articles/10.1186/s12877-017-0524-2>
<https://doi.org/10.1186/s12877-017-0524-2>
- [29] Zamora Mur, A., Palacín Ariño, C., Guardia Contreras, A.I., Zamora Catevilla, A., Clemente Roldán, E. and Santaliestra Grau, J. (2018) Importancia de la detección de la disfagia en pacientes geriátricos. *Medicina de Familia. SEMERGEN*, **44**, 168-173.
<https://linkinghub.elsevier.com/retrieve/pii/S1138359317300783>
<https://doi.org/10.1016/j.semerg.2017.03.001>
- [30] Takayama, K., Hirayama, K., Hirao, A., Kondo, K., Hayashi, H., Kadota, K., *et al.* (2017) Survival Times with and without Tube Feeding in Patients with Dementia or Psychiatric Diseases in Japan: Survival with and without Tube Feeding. *Psychogeriatrics*, **17**, 453-459. <https://onlinelibrary.wiley.com/doi/10.1111/psyg.12274>
<https://doi.org/10.1111/psyg.12274>
- [31] Clayton, N.A., Nicholls, C.M., Blazquez, K., Brownlow, C., Maitz, P.K., Fisher, O.M., *et al.* (2018) Dysphagia in Older Persons following Severe Burns: Burn Location Is Irrelevant to Risk of Dysphagia and Its Complications in Patients over 75 Years. *Burns*, **44**, 1997-2005.
<https://linkinghub.elsevier.com/retrieve/pii/S0305417918306272>
<https://doi.org/10.1016/j.burns.2018.07.010>
- [32] Eglseer, D., Halfens, R.J.G., Schols, J.M.G.A. and Lohrmann, C. (2018) Dysphagia in Hospitalized Older Patients: Associated Factors and Nutritional Interventions. *The Journal of Nutrition, Health & Aging*, **22**, 103-110.
<http://link.springer.com/10.1007/s12603-017-0928-x>
<https://doi.org/10.1007/s12603-017-0928-x>
- [33] Appel-da-Silva, M.C., Zuchinali, P., De Oliveira, R.F., Boligon, C.S., Riella, C. and Salazar, G.S. (2019) Nutritional Profile and Mortality in Patients Undergoing Percutaneous Endoscopic Gastrostomy. *Nutrición Hospitalaria*, **36**, 499-503.
<https://www.nutricionhospitalaria.org/articles/02348/show>
<https://doi.org/10.20960/nh.2348>
- [34] Katagiri, S., Shiba, T., Tohara, H., Yamaguchi, K., Hara, K., Nakagawa, K., *et al.* (2019) Re-Initiation of Oral Food Intake following Enteral Nutrition Alters Oral and Gut Microbiota Communities. *Frontiers in Cellular and Infection Microbiology*, **9**, Article 434. <https://www.frontiersin.org/article/10.3389/fcimb.2019.00434/full>
<https://doi.org/10.3389/fcimb.2019.00434>
- [35] Lin, Y.M., Wang, M., Sun, N.X., Liu, Y.Y., Yin, T.F. and Chen, C. (2019) Screening and Application of Nutritional Support in Elderly Hospitalized Patients of a Tertiary Care Hospital in China. *PLOS ONE*, **14**, e0213076.
<https://dx.plos.org/10.1371/journal.pone.0213076>
<https://doi.org/10.1371/journal.pone.0213076>

- [36] He, Y., Xiao, J., Shi, Z., He, J. and Li, T. (2019) Supplementation of Enteral Nutritional Powder Decreases Surgical Site Infection, Prosthetic Joint Infection, and Readmission after Hip Arthroplasty in Geriatric Femoral Neck Fracture with Hypoalbuminemia. *Journal of Orthopaedic Surgery and Research*, **14**, Article No. 292. <https://josr-online.biomedcentral.com/articles/10.1186/s13018-019-1343-2>
<https://doi.org/10.1186/s13018-019-1343-2>
- [37] Castanon, L., Asmar, S., Bible, L., Chehab, M., Ditillo, M., Khurram, M., et al. (2020) Early Enteral Nutrition in Geriatric Burn Patients: Is There a Benefit? *Journal of Burn Care & Research*, **41**, 986-991. <https://academic.oup.com/jbcr/article/41/5/986/5864763>
<https://doi.org/10.1093/jbcr/iraa109>
- [38] Tran, T.P., Nguyen, L.T., Kayashita, J., Shimura, F. and Yamamoto, S. (2020) Nutritional Status and Feeding Practice among Dysphagic Older Adult Inpatients in Vietnam. *Journal of Nutritional Science and Vitaminology*, **66**, 224-228. https://www.jstage.jst.go.jp/article/jnsv/66/3/66_224/article
<https://doi.org/10.3177/jnsv.66.224>
- [39] Formisano, E., Di Maio, P., Ivaldi, C., Sferrazzo, E., Arieta, L., Bongiovanni, S., et al. (2021) Nutritional Therapy for Patients with Coronavirus Disease 2019 (COVID-19): Practical Protocol from a Single Center Highly Affected by an Outbreak of the Novel Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) Infection. *Nutrition*, **82**, Article ID: 111048. <https://linkinghub.elsevier.com/retrieve/pii/S0899900720303312>
<https://doi.org/10.1016/j.nut.2020.111048>
- [40] Lai, X., Zhu, H., Du, H., Huo, X. and Yu, K. (2021) Nutritional Status of Chinese Oldest-Old Adults (≥ 80 Years of Age): A Cross-Sectional Study in Beijing. *European Journal of Clinical Nutrition*, **75**, 1040-1046. <https://www.nature.com/articles/s41430-020-00826-w>
<https://doi.org/10.1038/s41430-020-00826-w>
- [41] Olsen, S.U., Hesseberg, K., Aas, A.M., Pripp, A.H., Ranhoff, A.H. and Bye, A. (2022) Correction to: A Comparison of Two Different Refeeding Protocols and Its Effect on Hand Grip Strength and Refeeding Syndrome: A Randomized Controlled Clinical Trial. *European Geriatric Medicine*, **13**, 1231-1232. <https://link.springer.com/10.1007/s41999-022-00653-1>
<https://doi.org/10.1007/s41999-022-00653-1>
- [42] Suzuki, K., Sugiyama, R., Katano, T., Shigehara, H., Takagiwa, T., Katafuchi, I., et al. (2022) The Safety of Rapid Administration of Enteral Nutrition in Acute Stroke Patients. *Journal of the Neurological Sciences*, **437**, Article ID: 120270. <https://linkinghub.elsevier.com/retrieve/pii/S0022510X22001320>
<https://doi.org/10.1016/j.jns.2022.120270>
- [43] Zhao, J., Yuan, F., Song, C., Yin, R., Chang, M., Zhang, W., et al. (2022) Safety and Efficacy of three Enteral Feeding Strategies in Patients with Severe Stroke in China (OPENS): A Multicentre, Prospective, Randomised, Open-Label, Blinded-Endpoint Trial. *The Lancet Neurology*, **21**, 319-328. <https://linkinghub.elsevier.com/retrieve/pii/S1474442222000102>
[https://doi.org/10.1016/S1474-4422\(22\)00010-2](https://doi.org/10.1016/S1474-4422(22)00010-2)
- [44] Chen, L., Zheng, S., Xie, Q., Huang, L. and Yin, G. (2022) The Effect of Different Nutritional Nursing Support on the Nutritional Status and Disease Recovery of Elderly Patients with Gastrointestinal Tumors during the Perioperative Period. *Computational and Mathematical Methods in Medicine*, **2022**, Article ID: 4977922. <https://www.hindawi.com/journals/cmmm/2022/4977922/>

<https://doi.org/10.1155/2022/4977922>

- [45] Yuen, J.K., Luk, J.K.H., Chan, T.C., Shea, Y.F., Chu, S.T., Bernacki, R., *et al.* (2022) Reduced Pneumonia Risk in Advanced Dementia Patients on Careful Hand Feeding Compared with Nasogastric Tube Feeding. *Journal of the American Medical Directors Association*, **23**, 1541-1547.E2.

<https://linkinghub.elsevier.com/retrieve/pii/S1525861022002559>

<https://doi.org/10.1016/j.jamda.2022.03.011>