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Dysphagia in Hospitalised Older Adults: Prevalence, Incidence and Predictors in the Multicentre NUTRIFAG Cohort: Empirical Research Quantitative

Cristina Carretero-Randez[1,2] | María Isabel Orts-Cortés[3,4,5] | Lilia De Souza-Nogueira[6] | Joaquín Moncho-Vasallo[7] | Rafaela Camacho-Bejarano[4,8,9] | on behalf of the NUTRIFAG Working Group

[1]Nursing Hospital University and Polytechnic La Fe, Valencia, Spain | [2]Nursing Research Group: Infection, Inflammation and Chronicity (IIS La Fe), Hospital University and Polytechnic La Fe, Valencia, Spain | [3]Department of Nursing, University of Alicante (BALMIS), Alicante Institute for Health and Biomedical Research (ISABIAL, Group 23), Alicante, Spain | [4]Nursing and Healthcare Research Unit (Investén-Isciii), Instituto de Salud Carlos III, Madrid, Spain | [5]CIBER of Frailty and Healthy Aging (CIBERFES), Madrid, Spain | [6]Department of Medical-Surgical Nursing, School of Nursing, University of São Paulo, São Paulo, Brazil | [7]Research Unit for the Analysis of Mortality and Health Statistics, Department of Community Nursing, Preventive Medicine, Public Health and History of Science, University of Alicante, Alicante Institute for Health and Biomedical Research (ISABIAL), Alicante, Spain | [8]Department of Nursing, Nursing Faculty, University of Huelva, Huelva, Spain | [9]Research Network on Chronicity, Primary Care and Health Promotion (RICAPPS), Madrid, Spain

Correspondence: María Isabel Orts-Cortés (isabel.orts@ua.es)

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ABSTRACT

Aims: To determine the prevalence, incidence, associated factors and progression of suspected and clinically diagnosed dysphagia in hospitalised adults aged 65 years and over.

Design: A multicentre prospective observational cohort study in nine public hospitals.

Methods: Older adults (≥ 65 years) staying ≥ 48 h were consecutively recruited. Sociodemographic, functional, cognitive, nutritional and clinical data were collected at admission and discharge. Dysphagia was screened using the Eating Assessment Tool-10 and clinically diagnosed with the Volume-Viscosity Swallow Test. Descriptive, bivariate and multivariate analyses included logistic and Cox regression models. The study was approved by participating ethics committees.

Results: The study included 3139 patients with discharge data available for 2817. Suspected dysphagia affected 16.01% at admission and 12.96% at discharge; among clinically assessed patients, diagnosed dysphagia affected 69.66% and 76.57%, respectively. New cases appeared during hospitalisation (2.50% suspected; 8.33% diagnosed). Lower calf circumference, functional dependence and mild cognitive impairment were independently associated with both suspected and confirmed dysphagia. The presence of dysphagia was linked to longer hospital stays.

Conclusion: Dysphagia was common and often persisted or worsened during hospitalisation in older adults. Its association with functional, cognitive and nutritional vulnerability reinforces the need for systematic screening and follow-up.

Implications for the Profession and/or Patient Care: Nurses can integrate dysphagia screening and reassessment into geriatric care, prioritising older inpatients with functional, cognitive or nutritional vulnerability.

Impact: Dysphagia persisted or emerged during hospitalisation; findings support the potential value of nurse-led screening and reassessment in hospitalised older adults.

The NUTRIFAG Working Group is a collective authorship representing a multicentre research initiative on malnutrition and dysphagia in hospitalised older adults. The list of members is provided in the Acknowledgements. María Isabel Orts-Cortés is the principal investigator (PI) and corresponding author on behalf of the group.

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Reporting Method: Reported in accordance with the Strengthening the Reporting of Observational Studies in Epidemiology statement for cohort studies.

Patient or Public Contribution: A patient representative contributed to study design and variable selection. The NUTRIFAG Public Advisory Group supported the interpretation of findings and clinical relevance.

1 | Introduction

Dysphagia, understood as difficulty in swallowing safely and effectively, is now recognised as a geriatric syndrome (Baijens et al. 2016; Martín et al. 2018; Hu et al. 2024) due to its multifactorial nature, its high prevalence in older adults and its close relationship with other syndromes such as frailty and cognitive impairment, as well as with functional consequences such as dependency (Castillo Mier et al. 2025; Doan et al. 2022; Rivelsrud et al. 2023; Dini et al. 2025). Despite its clinical impact, systematic screening and management of dysphagia remain limited in routine hospital practice, where its detection is often reactive rather than preventive (Rebollo Pérez et al. 2023). Furthermore, the literature tends to associate dysphagia in this population with specific clinical conditions, such as neurodegenerative diseases, oncological diseases or the side effects of certain treatments, which has limited its study from a comprehensive geriatric perspective (Rajati et al. 2022; Chen et al. 2022). In addition, available evidence in older adults has largely focused on prevalence, while longitudinal data describing how dysphagia changes during hospitalisation remain limited, particularly in heterogeneous geriatric populations (Doan et al. 2022; Rivelsrud et al. 2023; Dini et al. 2025).

Recognising dysphagia as part of the frailty spectrum underscores the crucial role of nurses in early identification and monitoring. This evidence gap is particularly relevant to nursing practice, as it limits the evidence available to guide systematic surveillance and timely reassessment during hospitalisation. Integrating structured dysphagia screening within routine nursing assessments may help prevent complications, support safer nutrition and contribute to person-centred hospital care. In this context, analysing the frequency, progression and associated factors of dysphagia in older inpatients is important to strengthen the evidence base for identifying patients who may require closer monitoring and, in turn, to inform individualised care planning, support recovery and promote the efficient use of hospital resources.

2 | Background

In recent decades, increasing life expectancy has contributed to the progressive aging of the world's population, with a steady increase in the number of older adults (Speyer et al. 2022; Aguilar Navarro and Morales Salazar 2026). This demographic phenomenon is accompanied by a gradual decline in various physiological functions, which increases vulnerability to geriatric syndromes such as frailty, sarcopenia, malnutrition and dysphagia (Martín et al. 2018; Rebollo Pérez et al. 2023; Zhang et al. 2023; García Rodríguez et al. 2022). Dysphagia is defined as an impairment of the safety and/or efficacy of the swallowing process, which compromises the adequate transport of the food bolus from the oral cavity to the stomach. In older adults, age-related changes in the upper digestive tract, known as presbyphagia, may increase the risk of developing dysphagia, although they do not always lead to clinically significant functional impairment (Speyer et al. 2022). When clinical dysphagia appears, however, it becomes a relevant marker of vulnerability and frailty, closely associated with nutritional, respiratory and functional complications (García Rodríguez et al. 2022; Bosch et al. 2023).

The reported prevalence of dysphagia in older adults varies widely, ranging from 13% to 50% in general populations and exceeding 30% in hospital settings (Castillo Mier et al. 2025; Doan et al. 2022; Rivelsrud et al. 2023; Rajati et al. 2022; Banda et al. 2022). This heterogeneity is largely related to differences in diagnostic criteria, the screening tools used, the care setting and the country in which it is assessed.

In the Spanish context, the available evidence on dysphagia in hospitalised elderly people is limited and also shows considerable variability. Some national studies have estimated prevalence between 30% and 50% in patients with stroke or other acute clinical conditions (Karunaratne et al. 2024), while other studies have focused on the community-dwelling elderly population, where high rates (up to 45%) have also been identified (Montero et al. 2025). However, these data cannot be directly extrapolated to the general hospital population.

Globally, evidence on the incidence of dysphagia in hospitalised older adults is still scarce. Available studies tend to focus on specific dysphagia subtypes (Nagano et al. 2023) or populations with specific clinical conditions (Karunaratne et al. 2024; Makhnevich et al. 2022; Perry et al. 2021), which makes it difficult to generalise their findings.

Among the main relevant determinants of dysphagia, age, frailty, functional dependence, multimorbidity and polypharmacy have been identified (Chen et al. 2022; Zhang et al. 2023; Bosch et al. 2023). Beyond its impact on food and nutrition security, dysphagia has recently been linked to longer hospital stays and increased use of healthcare resources (García Rodríguez et al. 2022; Banda et al. 2022; Poulsen et al. 2021), reinforcing its relevance as a health problem in acute clinical settings.

In this situation, early detection of dysphagia is essential to prevent complications, plan individualised interventions and improve clinical outcomes. Validated tools exist for screening and diagnosis in this context, such as the Eating Assessment Tool-10 (EAT-10) questionnaire or the Volume-Viscosity Swallow Test (V-VST) (Doan et al. 2022), but their systematic integration into clinical practice is still insufficient (Chen et al. 2022; Speyer et al. 2022). Although several studies have described the prevalence of dysphagia, few have analysed its progression during hospitalisation or its associated factors from a geriatric population approach, without focusing on specific diseases (Hu et al. 2024; Chen et al. 2022; Makhnevich et al. 2022). This

limitation hinders a real understanding of its impact in the hospital setting and hinders the design of effective and safe strategies to address it.

Therefore, knowledge of the prevalence, incidence and clinical course of dysphagia, as well as associated factors, is essential to improve the quality of care for hospitalised older adults for the future development of screening and intervention strategies from nursing practice and evidence-based health policies.

3 | The Study

3.1 | Aims and Objectives

The aim of this study was to determine the prevalence and cumulative incidence of suspected and clinically diagnosed dysphagia at hospital admission and discharge in adults aged 65 years and older admitted to medical and surgical wards; to identify factors associated with suspected and diagnosed dysphagia at admission; to examine changes in dysphagia status during hospitalisation; and to assess the association between dysphagia at admission and length of hospital stay.

4 | Methods

4.1 | Design

A multicentre prospective observational cohort study was conducted. The study is reported in accordance with the STROBE statement for reporting observational research (Data S3).

4.2 | Instrument With Validity and Reliability

The data and variables used in this study are framed within the NUTRIFAG project (Carretero Randez et al. 2023), with a published protocol that provides a more detailed description of the instruments used and the methodological criteria applied.

The study variables were organised into seven groups: (i) Dysphagia; (ii) Sociodemographic variables; (iii) Nutritional status; (iv) Clinical, functional, cognitive and frailty variables; (v) Risk profile; (vi) Contextual variables and (vii) Care process. A detailed classification of variables, instruments, use by group and time of collection is provided in Table S1.

Assessment of dysphagia was performed using two validated tools. Screening for suspected dysphagia was carried out with the Eating Assessment Tool-10 (EAT-10), a self-administered questionnaire consisting of 10 items. The Spanish version has demonstrated high internal consistency ($\alpha = 0.878$) and good discriminant validity between people with and without dysphagia (Burgos et al. 2012). Clinical diagnosis of dysphagia was performed using the Volume-Viscosity Swallow Test (V-VST), employing the validated Spanish version (MECV-V), which adheres to the original protocol developed by Clavé et al. (Clavé et al. 2008). The test was administered only to patients with positive EAT-10 (≥ 3 points), following a sequential screening and assessment pathway recommended for dysphagia detection, in which patients identified as being at risk through screening undergo subsequent clinical swallowing evaluation (Doan et al. 2022; Pedrón Barberá et al. 2026; Riera et al. 2021; Umay et al. 2022; Viney et al. 2022). This method has shown a sensitivity of 84%–88%, specificity of 64%–67% and substantial inter-rater agreement ($\kappa = 0.63–0.77$) (Clavé et al. 2008).

A distinction was made between patients with a previously documented diagnosis of dysphagia (recorded in the clinical history) and those with a new diagnosis established at admission through the study screening (EAT-10) and evaluation (V-VST). Accordingly, all participants underwent initial screening with the EAT-10, whereas the V-VST was subsequently performed only in those with a positive screening result or a previously documented diagnosis of dysphagia. Cases with a previous or current diagnosis were included as existing dysphagia at admission for prevalence estimates, whereas only patients without dysphagia (neither previously diagnosed nor identified at admission) were considered for incidence calculations.

From these variables we constructed: (a) prevalence of suspected and diagnosed dysphagia at admission and discharge; (b) cumulative incidence of suspected and diagnosed dysphagia at discharge (new cases); (c) progression of dysphagia during hospitalisation. Two dichotomous variables were created corresponding to the situation of each patient at two points in time: 'Suspected or Diagnosed dysphagia at admission' and 'Suspected or Diagnosed dysphagia at discharge', coded as presence of suspected or diagnosed dysphagia and absence. These variables allowed assessment of individual change during hospitalisation.

The remaining dimensions were assessed using validated instruments culturally adapted to the Spanish context and suitable for the hospitalised geriatric population. Functional status was measured with the Barthel Index ($\alpha = 0.88–0.92$; ICC = 0.99) (González et al. 2018) and cognitive status with the Pfeiffer Questionnaire (SPMSQ) ($\alpha = 0.82$; AUC = 0.89) (Martínez de la Iglesia et al. 2001). Frailty was assessed with the FRAIL scale, validated in a Spanish-speaking population (Rosas Carrasco et al. 2016), and social risk with the Gijón Socio-Family Scale, with good inter-rater reliability (ICC = 0.96) (Cabrera González et al. 1999). Comorbidity was measured with the Charlson Index (AUC 0.70–0.83) (Charlson et al. 1987) and risk of pressure injuries with the Braden scale, which has demonstrated high sensitivity (81%–100%) and specificity in hospitalised older adults (Bernal et al. 2001).

In general, the instruments used showed adequate psychometric properties, with internal consistency values (Cronbach's α) between 0.74 and 0.96 and inter-rater reliability (ICC) indices above 0.90, where available.

4.3 | Sampling and Recruitment

The study was conducted in nine public hospitals located in various regions of Spain, ensuring geographical and institutional diversity in acute medical and surgical wards. Participants were selected using non-probability consecutive sampling, based on order of admission and eligibility criteria. Recruitment took

place over 2 years, from October 2022 to December 2024, allowing for the timely inclusion of all eligible patients admitted consecutively. In each participating hospital, admission registers and electronic medical records were reviewed daily to identify potentially eligible patients. Once selected the patients, they were located in the admission unit, where they were provided with detailed information about the study through face-to-face interviews and their written informed consent was obtained. This approach was chosen for its feasibility in routine clinical settings.

4.4 | Sample Size

The planned sample size was 4077 patients, corresponding to approximately 453 participants per hospital. Sample size was estimated considering both the Freeman criterion for multivariable logistic regression and a prevalence-based approach; the latter, was calculated using the GRANMO-IMIM sample size calculator and, assuming a 50% prevalence, 95% confidence level, 5% precision and 15% expected losses, yielded the larger required sample and was therefore adopted, as described in the previously published NUTRIFAG study protocol (Carretero Randez et al. 2023).

4.5 | Population and Sample

The source population comprised adults aged 65 years and older admitted to acute medical or surgical wards of the nine participating public hospitals. A total of 4144 patients were assessed during the recruitment period. Patients who did not meet eligibility criteria or presented missing essential data were excluded, resulting in a final sample of 3139.

4.6 | Inclusion and Exclusion Criteria

Eligible participants were patients aged 65 years or older who were admitted to medical or surgical wards in participating hospitals, with a minimum expected hospital stay of 48 h and provision of informed consent, either directly by the patient or through a legal representative. A minimum stay of 48 h was required to ensure the feasibility of evaluating changes occurring during hospitalisation.

Patients were excluded if they had a terminal condition, were receiving enteral or parenteral nutrition prior to admission, had a primary diagnosis of cancer, were transferred to critical care units or had a confirmed COVID-19 diagnosis.

4.7 | Data Collection

In each participating hospital, a multidisciplinary team comprising nurses, nutritionists, medical specialists and support staff was set up with a clinical coordinator, whose main role was to supervise and ensure compliance with the methodological procedures.

During the 24–48 h after admission, data related to dysphagia (EAT-10 and V-VST), nutritional status (Mid-upper arm Circumference and Calf Circumference), as well as sociodemographic (age, sex, marital status, cohabitation, schooling and caregiver), clinical (Polypharmacy), functional (Barthel Index), cognitive (Pfeiffer Index) and frailty (Charlson Index and FRAIL questionnaire) information were collected. Variables relating to risk profile (Braden and Gijón scale), hospital context (ward type, origin, type of process and type of admission) and care process (length of stay) were also collected. The assignment of these tasks depended on the organisational structure of each centre and was carried out by nurses, nutritionists and/or speech therapists/phoniatrists, who received specific training.

Clinical assessment of dysphagia using the V-VST instrument was performed, according to the study protocol (Carretero Randez et al. 2023), only in participants with suspected dysphagia (EAT-10 score ≥ 3) or a previously documented diagnosis of dysphagia. Patients with EAT-10 scores < 3 were not candidates for diagnostic evaluation and were not considered lost to follow-up.

During hospitalisation, all patients (those with a previous diagnosis and those newly identified) were followed up and re-evaluated according to the same clinical protocol. In patients with moderate to severe cognitive impairment (Pfeiffer ≥ 5 errors), when self-reporting was unreliable, suspected dysphagia was identified based on clinical observation and caregiver reports (when available). When dysphagia screening information could not be obtained reliably through self-reporting, clinical observation or caregiver reports, swallowing function was assessed directly using the V-VST whenever feasible. Clinical, anthropometric, contextual and care process data were obtained from the electronic medical record or by standardised direct assessment.

Study data were collected and managed using REDCap (Research Electronic Data Capture) electronic data capture tools hosted at an academic research institution in Spain. REDCap is a secure, web-based software platform designed to support data capture for research studies (Harris et al. 2009; Harris et al. 2019). To ensure the homogeneity and reliability of the process, the researchers responsible for data collection received specific training in the use of the platform, guaranteeing compliance with the established methodological standards.

4.8 | Data Analysis

Qualitative variables were described using frequencies and percentages, while quantitative variables were summarised using measures of central tendency (mean or median) and dispersion (standard deviation or interquartile range), according to their distribution. For the main objective of the study, the prevalence and incidence of suspected and clinically diagnosed dysphagia were estimated. Prevalence was calculated both at admission and discharge. The incidence of dysphagia at discharge was determined exclusively among patients with no diagnosis at admission who were re-evaluated at discharge.

Ninety-five per cent confidence intervals (95% CI) were calculated for all estimates and a level of statistical significance of $p \leq 0.05$ was established. Unless otherwise specified, analyses were performed using an available-case approach; therefore, sample sizes and denominators may vary across variables according to data availability.

Associations between dysphagia and clinical or sociodemographic variables were explored using statistical tests according to the type and distribution of data, Chi-square or Fisher's exact tests for qualitative variables and Student's *t*-test or Mann–Whitney *U*-test for quantitative variables. To identify factors associated with suspected and diagnosed dysphagia at admission, multivariable binary logistic regression models with LASSO variable selection were fitted. Candidate predictors were selected a priori based on clinical relevance and previous literature and were initially evaluated using simple logistic regression analyses. Subsequently, these predictors were entered into a Least Absolute Shrinkage and Selection Operator (LASSO) procedure with 10-fold cross-validation. The sample was randomly divided into 10 subsets; at each iteration, one subset was excluded and the remaining nine were used to fit the model, which was then tested on the excluded subset. This process was repeated until each subset had served once as the validation sample and was repeated multiple times to improve stability. Variables consistently retained across iterations were selected according to the one-standard-error rule, favouring the most parsimonious model within one standard error of the minimum cross-validation error. The variables retained through this procedure constituted the final predictive models for suspected and diagnosed dysphagia. For logistic regression models, *p*-values were derived from Wald tests, whereas 95% confidence intervals for odds ratios were estimated using the profile-likelihood method. The overall fit of the models was assessed using McFadden's pseudo-R^2 coefficient, and the discriminative ability was evaluated by the area under the ROC curve (AUC). Model calibration was examined graphically using calibration plots based on deciles of predicted probabilities and LOESS smoothing with 95% confidence intervals.

The progression of suspected or diagnosed dysphagia between admission and discharge was analysed using McNemar's test for paired data. A multivariate Cox regression model was fitted to identify factors associated with time to discharge (days of stay). Explanatory variables included the presence of risk or diagnosis of dysphagia, along with other clinical and sociodemographic variables. The proportional hazards assumption for the Cox regression model was assessed using scaled Schoenfeld residuals. Global and covariate-specific tests were performed, complemented by graphical inspection of scaled Schoenfeld residuals over time. Sensitivity analyses for the Cox regression model were conducted to evaluate the potential impact of missing data, including multiple imputation and best-case/worst-case scenario analyses. Statistical analysis was performed using R software, version 4.5.0.

4.9 | Ethical Considerations

The study was approved by the Research Ethics Committee for Medicinal Products (CEIm) of a public hospital in Spain on 30 September 2020, as well as by the ethics committees of all participating hospitals. Written informed consent was obtained from all participants or, where appropriate, from their legal representatives before enrolment. The study was conducted in accordance with the Declaration of Helsinki, Spanish Law 14/2007 on Biomedical Research, Regulation (EU) 2016/679 (General Data Protection Regulation), and Organic Law 3/2018 on the Protection of Personal Data and Guarantee of Digital Rights. Participant confidentiality was protected through pseudonymisation and appropriate data-security procedures.

5 | Results

5.1 | Patient Flow and Characteristics

During the recruitment period, 4144 patients were screened. Of these, 3139 met the inclusion criteria and were included in the analysis (Figure 1). Among them, 3035 were assessed for dysphagia risk using the EAT-10 questionnaire. At admission, 486 patients had suspected dysphagia (EAT-10 $\geq$ 3); 417 underwent clinical evaluation with the V-VST, and 140 had a previously documented diagnosis of dysphagia in their medical records. In total, dysphagia diagnosis information was available for 557 patients at admission, according to the study protocol.

At discharge, 2817 patients (89.70% of the original cohort) remained available for reassessment; 322 patients (10.30%) could not be re-evaluated due to newly met exclusion criteria during hospitalisation ($n = 234$), early discharge ($n = 62$), withdrawal of informed consent ($n = 16$) or in-hospital death ($n = 10$). Reassessment of dysphagia risk was completed in 2531 patients, of whom 328 were identified as being at risk. Dysphagia diagnosis information at discharge was available for 367 patients, including 163 who underwent V-VST reassessment and 204 with a previously documented diagnosis of dysphagia recorded in their medical records.

A comparison of baseline characteristics between participants who completed the discharge assessment and those without discharge assessment data showed that the latter were slightly older and had lower arm and calf circumference measurements at admission. No significant differences were observed regarding sex, cognitive status, functional dependence, frailty, comorbidity, dysphagia suspicion, or dysphagia diagnosis at admission (Table S2).

The final sample included 3139 hospitalised patients aged 65 years and older, with a mean age of 79.3 years (SD 8.1; range 65–102; 95% CI 79.05–79.62). Slightly more than half were men (51.6%; $n = 1618$; 95% CI 49.80–53.29), and most were married or cohabiting (52.1%; $n = 1620$; 95% CI 50.30–53.81). The majority lived with others (83.3%; $n = 2603$; 95% CI 81.92–84.54), had completed primary education (49.4%; $n = 1477$; 95% CI 47.56–51.14), and more than half had an identified primary caregiver at admission (56.2%; $n = 1756$; 95% CI 54.41–57.89).

Most patients were admitted to medical wards (82.5%; $n = 2590$; 95% CI 81.14–83.80), followed by mixed (13.6%; $n = 428$; 95% CI 12.48–14.88) and surgical wards (3.9%; $n = 121$; 95% CI 3.23–4.59). The vast majority came from home (92.6%), and

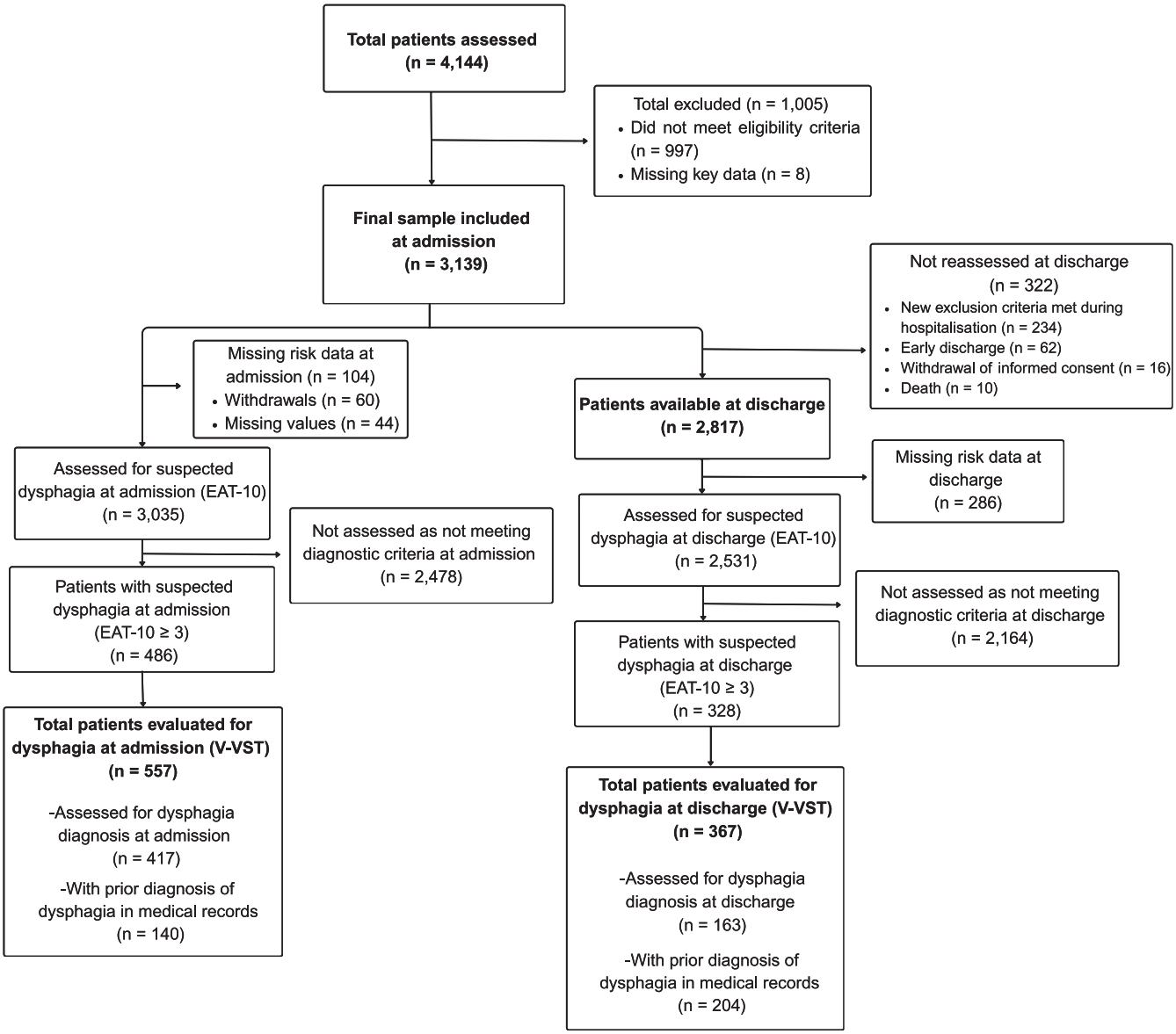

FIGURE 1 | Flow diagram of participant inclusion and availability of data for dysphagia outcomes from admission to discharge. The diagram illustrates the number of patients assessed, excluded and included in the final analysis, as well as the availability of data for dysphagia screening and diagnosis during hospitalisation. EAT-10, Eating Assessment Tool-10; V-VST, Volume-Viscosity Swallow Test.

more than 90% of admissions were urgent. The median hospital stay was 6 days (IQR 4–9).

Table 1 summarises the main clinical, functional, cognitive, frailty, and nutritional characteristics of the patients at admission and discharge.

5.2 | Prevalence and Cumulative Incidence of Dysphagia

At hospital admission, 16.01% of patients were identified as having suspected dysphagia according to the EAT-10 screening, while this proportion decreased slightly to 12.96% at discharge. Among participants who underwent clinical assessment with the V-VST, 69.66% had a diagnosis of dysphagia at admission, increasing to 76.57% at discharge. These estimates correspond to the subgroup selected for clinical assessment following a positive screening result or a previous diagnosis of dysphagia.

During hospitalisation, the cumulative incidence was 2.50% for newly identified cases of suspected dysphagia and 8.33% for new confirmed clinical diagnoses among patients with complete data at both time points. Overall, the prevalence of clinically diagnosed dysphagia increased from admission to discharge, while the proportion of patients with suspected dysphagia showed a slight decline (Table 2).

5.3 | Factors Associated With Dysphagia at Hospital Admission

Two logistic regression models were fitted to identify factors associated with suspected and clinically diagnosed dysphagia at hospital admission. Predictor variables included age,

TABLE 1 | Clinical and functional characteristics of patients at hospital admission and discharge.

	Admission ($n = 3139$)				Discharge ($n = 2817$)			
Variable	***n***	**Mean**	**SD**	**95% CI (LCL–UCL)**	***n***	**Mean**	**SD**	**95% CI (LCL–UCL)**
Mid-upper arm circumference[a]	3073	28.47	4.77	28.30–28.64	2208	28.35	4.58	28.16–28.54
Calf circumference[a]	3070	33.35	5.29	33.17–33.54	2208	33.21	4.88	33.01–33.42
	n	**%**		**95% CI (LCL–UCL)**	***n***	**%**		**95% CI (LCL–UCL)**
Polypharmacy[b]								
Yes	2562	82.75		81.38–84.04	1943	86.00		84.50–87.40
No	534	17.25		15.96–18.62	317	14.00		12.60–15.50
Barthel index[b]								
Independent	965	31.19		29.58–32.84	887	34.10		32.30–35.90
Mild dependence	193	6.24		5.44–7.15	168	6.50		5.50–7.40
Moderate dependence	667	21.56		20.14–23.04	578	22.20		20.60–23.80
Severe dependence	723	23.37		21.91–24.89	538	20.70		19.10–22.20
Total dependence	546	17.65		16.34–19.03	429	16.50		15.10–17.90
Pfeiffer (SPMSQ)[b]								
Normal	2094	68.75		67.08–70.37	1846	72.20		70.40–73.90
Mild impairment	365	11.98		10.88–13.19	249	9.70		8.60–10.90
Moderate impairment	225	7.39		6.51–8.37	186	7.30		6.30–8.30
Severe impairment	362	11.88		10.78–13.08	277	10.80		9.60–12.00
Charlson index[b]								
Low comorbidity	99	3.24		2.67–3.93	76	3.00		2.30–3.60
High comorbidity	2957	96.76		96.07–97.33	2486	97.00		96.40–97.70
FRAIL scale[b]								
No frailty	500	16.23		14.97–17.58	442	16.90		15.50–18.30
Pre-frailty	1332	43.25		41.51–45.00	1101	42.10		40.20–44.00
Likely frailty	1248	40.52		38.80–42.26	1074	41.00		39.20–42.90
Braden scale[b]								
Low risk	2656	85.90		84.63–87.07	2252	87.10		85.80–88.30
Moderate risk	206	6.66		5.83–7.60	170	6.60		5.60–7.50
High risk	230	7.44		6.56–8.42	165	6.40		5.40–7.30
Gijón scale[b]								
Favourable family situation	2896	93.69		92.78–94.50	2465	93.80		92.90–94.70
Socio-family risk	194	6.28		5.47–7.19	163	6.20		5.30–7.10
Social problem	1	0.03		0.00–0.20	—	—		—

Note: Total sample: $N = 3139$ at admission; $n = 2817$ at discharge. The number of valid cases varies across variables due to missing data. Percentages are calculated based on available cases at each point in time. SPMSQ, Short Portable Mental Status Questionnaire. —, not applicable or not estimated.

[a]Quantitative variables are presented as absolute frequency (*n*), mean, standard deviation (SD), 95% CI, 95% confidence interval; LCL, lower confidence limit; UCL, upper confidence limit.

[b]Qualitative variables are expressed as absolute frequency (*n*), relative frequency (%), 95% CI, 95% confidence interval; LCL, lower confidence limit; UCL, upper confidence limit.

sex, marital status, origin, ward type, admission type, caregiver, cohabitation, polypharmacy, mid-upper arm circumference (MUAC), calf circumference (CC), socio-familial risk (Gijón), functional dependence (Barthel), cognitive impairment (Pfeiffer), frailty (FRAIL), pressure injury risk (Braden) and comorbidity (Charlson).

TABLE 2 | Prevalence and cumulative incidence of suspected and clinically diagnosed dysphagia.

	Prevalence at admission			Prevalence at discharge			Incidence at discharge		
Variable	***n***	**%**	**95% CI (LCL–UCL)**	***n***	**%**	**95% CI (LCL–UCL)**	***n***	**%**	**95% CI (LCL–UCL)**
Suspected dysphagia	486	16.01[a]	14.75–17.36	328	12.96[a]	11.71–14.32	53	2.50[c]	1.90–3.20
Diagnosed dysphagia[e]	388	69.66[b]	65.71–73.33	281	76.57[b]	71.96–80.62	5	8.33[d]	3.21–18.47

Note: Prevalence refers to the presence of risk (EAT-10) or clinical diagnosis (V-VST) at each time point. Incidence refers to new cases identified among patients without dysphagia at admission.
Abbreviations: %, relative frequency; 95% CI, 95% confidence interval; LCL, lower confidence limit; *n*, absolute frequency; UCL, upper confidence limit.
[a]The prevalence of suspected dysphagia was calculated among patients with available data at admission ($n = 3035$) and at discharge ($n = 2531$).
[b]The prevalence of clinically diagnosed dysphagia was estimated in patients with clinical assessment at admission ($n = 557$) and at discharge ($n = 367$).
[c]The cumulative incidence of suspected dysphagia was calculated among patients with data available at both admission and discharge ($n = 2514$); the numerator corresponds to new cases identified at discharge among those without suspected dysphagia at admission ($n = 53$), and the denominator corresponds to all patients without suspected dysphagia at admission ($n = 2132$).
[d]The cumulative incidence of clinically diagnosed dysphagia was estimated in patients with complete clinical assessment at both admission and discharge ($n = 313$). The numerator corresponds to patients newly diagnosed at discharge without a prior diagnosis at admission ($n = 5$), and the denominator corresponds to all patients without clinical diagnosis at admission ($n = 60$).
[e]Diagnosed dysphagia refers to participants with available diagnostic status based on V-VST assessment or a previously documented diagnosis, according to the study protocol.

The final multivariable models and corresponding odds ratios are presented in Table 3. Complete univariable and multivariable regression results for both outcomes are reported in Table S3. Calibration plots demonstrated good agreement between predicted and observed probabilities across the range of estimated risks for both models (Figure S1).

5.3.1 | Predictors of Suspected Dysphagia at Admission

The model was estimated for 2962 patients after excluding 177 cases with incomplete data. Model fit was acceptable (McFadden's pseudo-$R^2 = 0.17$), and discrimination was good (AUC = 0.79; 95% CI: 0.76–0.81). Higher frailty, greater functional dependence, higher risk of pressure injuries and cognitive impairment were independently associated with increased likelihood of suspected dysphagia. A graded relationship was observed between both functional and cognitive status and dysphagia risk, with odds increasing progressively from mild to severe categories. Conversely, a lower calf circumference was associated with a higher likelihood of suspected dysphagia, suggesting that reduced muscle mass may be linked to an increased risk of swallowing difficulties.

5.3.2 | Predictors of Clinical Diagnosis of Dysphagia at Admission

The model identifying factors associated with clinically diagnosed dysphagia included 532 patients. The overall fit was adequate (McFadden's pseudo-$R^2 = 0.27$), and discrimination was high (AUC = 0.84; 95% CI: 0.80–0.87). Lower calf circumference, higher levels of functional dependence and mild cognitive impairment were the most relevant predictors of a confirmed diagnosis at admission. Total functional dependence showed the strongest association, while mild cognitive impairment remained significant after adjustment. Patients admitted to medical wards were more likely to have dysphagia compared with those admitted to surgical wards, although this difference did not reach conventional statistical significance after adjustment.

5.4 | Progression of Dysphagia During Hospitalisation

Table 4 summarises the changes in suspected and clinically diagnosed dysphagia between admission and discharge. Statistically significant differences were observed between both time points (McNemar's test, $p < 0.001$).

Among the 397 patients with complete assessments, 80.60% ($n = 320$) had suspected or diagnosed dysphagia at both admission and discharge, while 12.34% ($n = 49$) showed no dysphagia at either assessment. A small proportion of patients changed status: 6.05% improved (from dysphagia at admission to no dysphagia at discharge) and 1.01% developed new dysphagia during hospitalisation. These results indicate that dysphagia persisted in most patients, with only minor transitions between categories.

5.5 | Factors Associated With Length of Stay

The relationship between dysphagia at admission and length of hospital stay was examined. Patients with suspected or diagnosed dysphagia at admission had a significantly longer median stay (7 days, IQR 5–11) than those without dysphagia (6 days; IQR 4–9; Mann–Whitney $U = 470{,}356.5$; $p < 0.001$).

Table 5 presents the results of the Cox regression analyses, showing both unadjusted and adjusted hazard ratios for the variables of interest. After adjustment, the presence of suspected or diagnosed dysphagia at admission was associated with a significantly lower hazard of discharge (HR = 0.86; 95% CI: 0.77–0.96; $p = 0.008$), indicating longer hospital stays among these patients (Figure 2). The complete unadjusted and adjusted models are provided in Table S4.

TABLE 3 | Multivariable logistic regression models for suspected and diagnosed dysphagia at hospital admission.

	Suspected dysphagia[b,c]			Diagnosed dysphagia[b,c]		
Variables	**OR**	**95% CI (LCL–UCL)**	***p***	**OR**	**95% CI (LCL–UCL)**	***p***
Calf circumference	0.96	0.94–0.98	**<0.001**	0.93	0.88–0.98	**0.008**
Barthel index	—	—	**<0.001**	—	—	**<0.001**
Independent (ref.)[a]	1	—	—	1	—	—
Mild dependence	1.75	0.93–3.15	0.070	0.95	0.39–2.31	0.916
Moderate dependence	1.67	1.08–2.60	**0.021**	0.83	0.43–1.58	0.570
Severe dependence	2.98	1.98–4.56	**<0.001**	2.41	1.22–4.19	**0.011**
Total dependence	4.33	2.68–7.09	**<0.001**	12.31	4.63–35.64	**<0.001**
Pfeiffer (SPMSQ)	—	—	**<0.001**	—	—	0.097
Normal (ref.)[a]	1	—	—	1	—	—
Mild impairment	1.90	1.38–2.61	**<0.001**	2.06	1.05–4.18	**0.038**
Moderate impairment	1.90	1.30–2.75	**<0.001**	1.03	0.48–2.26	0.930
Severe impairment	2.88	2.04–4.06	**<0.001**	2.05	0.92–4.86	0.087
FRAIL scale	—	—	**0.037**	—	—	0.418
No frailty (ref.)[a]	1	—	—	1	—	—
Pre-frailty	1.44	0.89–2.41	0.150	1.60	0.79–3.32	0.196
Likely frailty	1.77	1.08–3.00	**0.027**	1.57	0.73–3.42	0.246
Braden	—	—	**0.023**	—	—	—
Low risk (ref.)[a]	1	—	—	—	—	—
Moderate risk	1.25	0.84–1.86	0.262	—	—	—
High risk	1.80	1.18–2.73	**0.006**	—	—	—
Ward type	—	—	—	—	—	**<0.001**
Surgical (ref.)[a]	—	—	—	1	—	—
Medical	—	—	—	4.64	1.14–31.50	0.056
Mixed	—	—	—	1.24	0.26–9.21	0.799
Polypharmacy	—	—	—	—	—	—
No (ref.)[a]	—	—	—	1	—	—
Yes	—	—	—	1.75	0.92–3.36	0.086

Note: p-Values were obtained using Wald tests, whereas 95% CIs for ORs were estimated using profile likelihood. Bold *p*-values indicate statistically significant results ($p \leq 0.05$).

Abbreviations: —, not applicable or predictor not retained in the final model; 95% CI, 95% confidence interval; LCL, lower confidence limit; OR, odds ratio; SPMSQ, Short Portable Mental Status Questionnaire; UCL, upper confidence limit.

[a]The category indicated as 'ref.' was used as the reference category.

[b]The final model was obtained using the LASSO method; only selected predictors are shown. Multivariable logistic regression models were subsequently adjusted with the selected variables.

[c]Complete univariable and multivariable logistic regression models are available in Table S3.

The global Schoenfeld test did not provide statistically significant evidence of violation of the proportional hazards assumption for the Cox model ($p = 0.076$). Although two covariate-specific tests were statistically significant, graphical inspection of the scaled Schoenfeld residuals did not reveal clear systematic time-dependent patterns, supporting the adequacy of the proportional hazards assumption. The main findings remained consistent across the complete-case analysis, multiple imputation analysis and best-case/worst-case sensitivity analyses. Figure S2 presents the scaled Schoenfeld residual plots over time, Table S5 reports the Schoenfeld residual tests, and Table S6 presents the missing-data sensitivity analyses, including multiple imputation and best-case/worst-case scenarios.

Functional dependency and frailty were independently associated with longer hospitalisation, with the strongest associations observed at higher levels of dependency and frailty ($p < 0.001$).

TABLE 4 | Changes in dysphagia status between admission and discharge.

	Suspected or diagnosed dysphagia at discharge			
	No		Yes	
Suspected or diagnosed dysphagia at admission	***n* (%)**	**95% CI (LCL–UCL)**	***n* (%)**	**95% CI (LCL–UCL)**
No	49 (12.34)	9.30–16.00	4 (1.01)	0.28–2.56
Yes	24 (6.05)	3.90–8.90	320 (80.60)	76.36–84.38

Note: Suspected or diagnosed dysphagia was defined as the presence of either suspected dysphagia or clinically diagnosed dysphagia at each assessment time point. Total sample: $N = 397$. Percentages were calculated using the total paired sample as the denominator. McNemar's test with continuity correction: $\chi^2 = 12.893$; $p < 0.001$.
Abbreviations: %, relative frequency; 95% CI, 95% confidence interval; LCL, lower confidence limit; *n*, absolute frequency; UCL, upper confidence limit.

TABLE 5 | Factors associated with length of hospital stay (Cox regression models).

	Unadjusted[c]			Adjusted[c]		
Variables	**HR[a]**	**95% CI (LCL–UCL)**	***p***	**HR[a]**	**95% CI (LCL–UCL)**	***p***
Suspected or diagnosed dysphagia (Yes)	0.75	0.68–0.83	**< 0.001**	0.86	0.77–0.96	**0.008**
Age	1.00	0.99–1.00	0.751	1.01	1.01–1.02	**< 0.001**
Origin	—	—	0.107	—	—	**0.049**
Home (ref.)[b]	1	—	—	1	—	—
Socio-health centres	1.07	0.91–1.26	0.351	1.22	1.03–1.45	**0.022**
Other hospital	0.71	0.45–1.12	0.144	0.74	0.46–1.18	0.207
Other ward within the same hospital	0.60	0.34–1.07	0.081	0.76	0.43–1.34	0.343
Barthel index	—	—	**< 0.001**	—	—	**< 0.001**
Independent (ref.)[b]	1	—	—	1	—	—
Mild dependence	0.85	0.72–1.01	0.069	0.87	0.74–1.04	0.123
Moderate dependence	0.83	0.75–0.92	**0.001**	0.88	0.78–0.98	**0.027**
Severe dependence	0.67	0.60–0.74	**< 0.001**	0.73	0.65–0.82	**< 0.001**
Total dependence	0.64	0.57–0.72	**< 0.001**	0.70	0.61–0.81	**< 0.001**
FRAIL scale	—	—	**< 0.001**	—	—	**< 0.001**
No frailty (ref.)[b]	1	—	—	1	—	—
Pre-frailty	0.79	0.71–0.89	**< 0.001**	0.85	0.75–0.95	**0.005**
Likely frailty	0.64	0.58–0.72	**< 0.001**	0.74	0.65–0.84	**< 0.001**

Note: Bold *p*-values indicate statistically significant results ($p \leq 0.05$).
Abbreviations: —, not applicable or, in adjusted columns, predictor not retained in the final model; 95% CI, 95% confidence interval; HR, hazard ratio; LCL, lower confidence limit; UCL, upper confidence limit.
[a]HR < 1 indicates a lower hazard of discharge and, therefore, a longer hospital stay. The adjusted model includes clinically relevant variables and those with $p < 0.05$ in bivariate analysis.
[b]The category indicated as 'ref.' was used as the reference category.
[c]The complete set of unadjusted and adjusted estimates is available in Table S4.

Conversely, age was slightly associated with a higher probability of hospital discharge (HR = 1.01; 95% CI: 1.01–1.02; $p < 0.001$), indicating marginally shorter stays among older patients. Admission from a socio-health centres was similarly associated with a higher likelihood of discharge compared with admission from home (HR = 1.22; 95% CI: 1.03–1.45; $p = 0.022$), suggesting shorter hospital stays in this group.

6 | Discussion

This study provides a comprehensive understanding of dysphagia among hospitalised older adults by jointly examining its prevalence, incidence, associated factors, and clinical progression during hospitalisation.

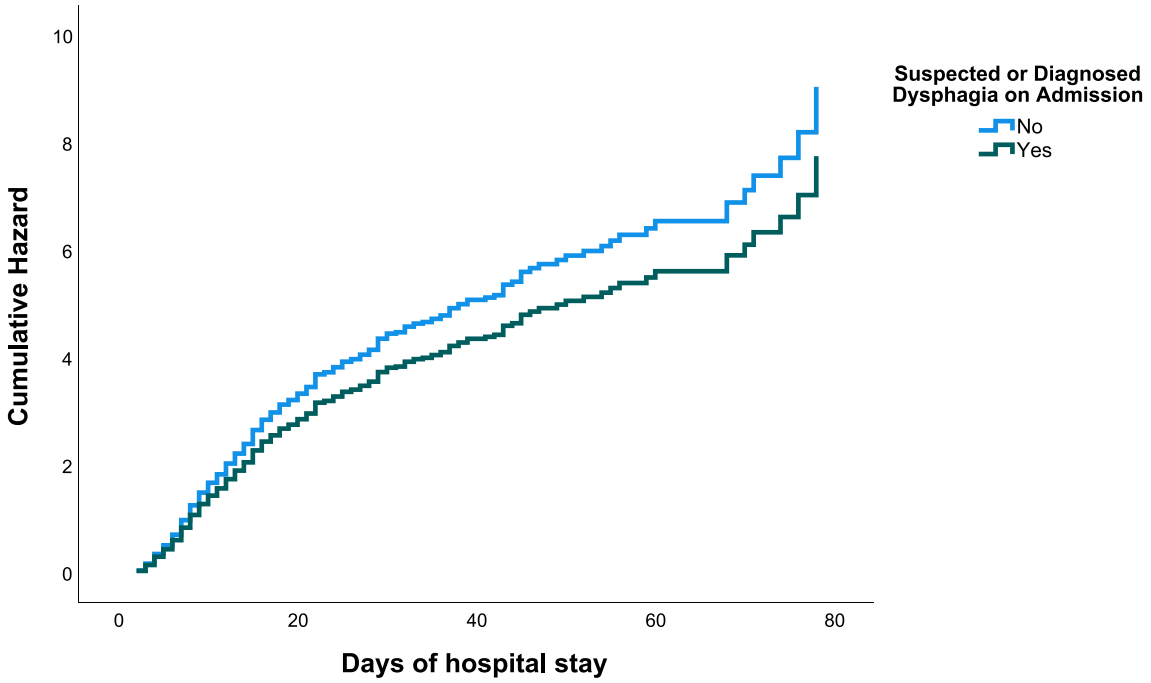

FIGURE 2 | Cumulative hazard function for hospital discharge by dysphagia status at admission. The cumulative hazard for hospital discharge was lower in patients with risk or diagnosis of dysphagia at admission (green line) compared to those without dysphagia (blue line), indicating longer hospital stays in the former group.

The participants included presented a clinical profile of high vulnerability: advanced age, comorbidity, functional dependence, frailty and polypharmacy. During the stay, slight improvements in functionality and cognition were observed, although the number of cases of probable frailty increased, possibly due to clinical fluctuations in borderline patients. The stability of the socio-family profile could facilitate recovery and adherence to care following discharge.

At admission, suspected dysphagia affected 16.01% of patients, while 69.66% of clinically assessed participants had diagnosed dysphagia. Differences from previous studies may reflect heterogeneity in populations and assessment strategies (Castillo Mier et al. 2025; Doan et al. 2022; Rivelsrud et al. 2023; Rajati et al. 2022; Nagano et al. 2023), particularly because the present study used a sequential screening and clinical assessment pathway. Although the proportion of patients with suspected dysphagia decreased at discharge, the proportion of clinically diagnosed dysphagia among clinically assessed participants increased. This trend may indicate functional recovery combined with heightened clinical awareness or the appearance of new symptoms during hospitalisation. The introduction of therapeutic or preventive measures could also have reduced perceived swallowing difficulties, resulting in negative screenings despite the persistence of diagnosis. These findings underscore the dynamic and multifactorial nature of dysphagia in acute care and the importance of continuous monitoring.

The cumulative incidence (2.50% for risk and 8.33% for diagnosis) confirms the occurrence of new cases among initially asymptomatic individuals, supporting the fluctuating course of dysphagia during hospitalisation. In contrast, Nagano et al. (Nagano et al. 2023) reported minimal incidence of sarcopenic dysphagia, with most cases present at admission. Given the scarcity of longitudinal studies in general hospital populations (Castillo Mier et al. 2025; Doan et al. 2022; Rivelsrud et al. 2023; Banda et al. 2022; Makhnevich et al. 2022; Perry et al. 2021), these results emphasise the need for further research to better characterise incidence patterns and recovery trajectories. Nonetheless, interpretation should remain cautious owing to losses to follow-up.

In the multivariate model, suspected dysphagia was associated with lower calf circumference, increased frailty, functional dependence, cognitive impairment and high pressure injury risk. Decreased peripheral muscle mass, estimated by calf circumference, may be indicative of sarcopenia, a condition frequently associated with dysphagia in hospitalised older adults (Chen et al. 2022; Karakurt et al. 2026). Although sarcopenic dysphagia was not specifically evaluated, the findings are consistent with the factors described in this entity, characterised by the coexistence of dysphagia and generalised muscle wasting in the absence of obvious neurological or structural disease (Nagano et al. 2023). Furthermore, frailty could act as an indirect indicator of functional impairment, aspects that compromise swallowing safety (Chen et al. 2022; Bosch et al. 2023). The association with higher pressure injury risk is consistent with the overall vulnerability profile observed among patients at greater risk of dysphagia. The functional dependence and cognitive impairment also showed a graded relationship with risk, reinforcing their clinical relevance as associated factors (Chen et al. 2022; Makhnevich et al. 2022).

For clinically diagnosed dysphagia, lower calf circumference, dependency, and mild cognitive impairment were significant predictors. The association with mild rather than severe impairment suggests that swallowing symptoms may be more readily

detected in early cognitive decline, when communication and collaboration remain feasible. In advanced stages, reduced cooperation and limited diagnostic feasibility may hinder detection. These differences emphasise the need for tailored diagnostic strategies adapted to cognitive status.

Most patients maintained dysphagia risk or diagnosis throughout hospitalisation, though 7% showed clinically meaningful changes, either improvement or new onset at discharge. This finding highlights the necessity of repeated screening, particularly among patients with functional, cognitive or nutritional vulnerability. Similarly, Nagano et al. (2023) reported greater recovery among patients with sarcopenic dysphagia compared to those with neurogenic dysphagia, supporting the existence of heterogeneous clinical trajectories requiring individualised follow-up.

Older age and previous institutionalisation were associated with higher discharge probability, suggesting slightly shorter hospital stays. Although this differs from some prior evidence (Poulsen et al. 2021), the effect size was small and may reflect within-group variability in a cohort of advanced age (mean age 79 years), where care goals are often predefined. Institutionalisation may have facilitated discharge planning through established care pathways, while dependent patients returning home required more complex coordination. Conversely, the presence of dysphagia, either suspected or diagnosed, was consistently linked to prolonged hospitalisation, aligning with previous studies associating swallowing disorders with greater care complexity, delayed discharge, and higher resource use (García Rodríguez et al. 2022; Banda et al. 2022; Poulsen et al. 2021).

Overall, these findings suggest that, beyond clinical characteristics, organisational and social factors influence hospital stay. Taken together, these findings reinforce the multidimensional and dynamic nature of dysphagia in hospitalised older adults and extend current evidence by showing its relationship with functional, cognitive and anthropometric parameters, as well as with length of hospital stay. The persistence and new onset of dysphagia during hospitalisation further support the need to consider swallowing difficulties as an evolving component of geriatric care rather than as a problem confined to admission.

6.1 | Implications for Nursing Practice, Education, Leadership and Policy

The main contribution of the results to nursing practice lies in showing that dysphagia in hospitalised older adults is a dynamic problem that may persist or emerge during hospitalisation and is associated with functional, cognitive and anthropometric vulnerability. This supports considering dysphagia not as an isolated swallowing disorder or a single assessment at admission, but as part of the broader clinical surveillance of vulnerable older adults. In practice, these findings may help nurses identify patients who require closer monitoring and timely reassessment and may inform multidisciplinary care pathways integrating prevention, clinical assessment, nutritional management, treatment, referral and continuity of care. Where organisational resources permit, such pathways could be coordinated through multidisciplinary dysphagia teams or dedicated dysphagia services.

For nursing education, the findings support training that extends beyond the technical use of screening tools and enables nurses to recognise dysphagia as an indicator of clinical vulnerability with implications for swallowing safety, nutritional status and patient well-being. For nursing leadership and organisational policy, the association of dysphagia with longer hospital stay, together with the influence of organisational and social factors, provides a rationale for promoting shared multidisciplinary pathways, clear referral processes and continuity of care across admission, hospitalisation and discharge. The originality of this study lies in the prospective assessment of prevalence, new onset and progression of dysphagia, together with multidimensional associated factors and hospital stay, in a large multicentre cohort of older adults admitted to general medical and surgical wards. Although conducted within the Spanish public health system, these findings may contribute to acute-care nursing internationally by providing clinically relevant evidence that can inform the development of locally adapted models of dysphagia care across different hospital settings.

6.2 | Strengths and Limitations

A major strength of this study is its prospective multicentre design, with a large cohort recruited across nine hospitals and standardised data collection procedures across participating centres. Dysphagia was assessed using validated screening and clinical assessment tools at admission and discharge, enabling its progression during hospitalisation to be examined. The inclusion of functional, cognitive, nutritional, frailty and clinical variables also allowed a multidimensional assessment of factors associated with dysphagia.

This study has several limitations that should be considered when interpreting the results. Although the sample was large and multicentre, it was restricted to medical and surgical wards of the Spanish National Health System, which limits the generalisability of the findings to other healthcare settings. To mitigate this limitation, recruitment was conducted across hospitals from diverse geographic regions. In addition, differences in healthcare organisation, care pathways and professional roles may limit the transferability of these findings to healthcare systems outside Spain. Although participants were recruited from multiple hospitals, potential centre-level effects were not specifically modelled and may have contributed to some variability in the estimates.

Dysphagia diagnosis was based on a sequential screening and assessment strategy, whereby the V-VST was only performed in participants with a positive EAT-10 result or a previous diagnosis of dysphagia. Although this approach reflects routine clinical practice and current recommendations, some cases of silent or minimally symptomatic dysphagia may not have been identified, potentially resulting in conservative estimates of dysphagia prevalence. Furthermore, because the V-VST was not systematically administered to all participants, the prevalence of clinically confirmed dysphagia could not

be estimated for the overall study population and should be interpreted only within the subgroup selected for clinical assessment. Consequently, a certain degree of misclassification bias cannot be completely excluded.

In addition, dysphagia screening based on self-reported symptoms may be challenging in patients with significant cognitive impairment. Although assessment procedures were adapted according to patients' clinical status whenever necessary, some degree of measurement bias and misclassification cannot be ruled out.

Losses at discharge prevented the re-evaluation of all patients, leading to differences between the samples available at admission and discharge. These losses were mainly attributed to logistical factors such as unplanned discharges or healthcare overload. The potential impact of missing discharge data (10.30%) was explored through a comparison of baseline characteristics according to discharge assessment status (Table S2). However, analyses related to incidence and clinical progression should be interpreted with caution due to this limitation.

Finally, the present analysis focused on dysphagia during hospitalisation. Therefore, the evolution of dysphagia beyond discharge and its potential association with subsequent clinical outcomes were outside the scope of this study.

Consecutive sampling and prospective data collection helped to reduce the risk of systematic exclusion. However, consecutive sampling may have affected representativeness and external validity. Nevertheless, the selection criteria were uniformly applied, and all participating centres followed a standardised data collection protocol. In terms of data quality, outliers were analysed and no cases with significant influence on the results were detected. Missing data were managed by available-case analysis. Despite this, missing data may have limited the analysis of certain associations. No relevant violations of statistical assumptions were observed, and appropriate procedures, such as variable selection using LASSO, were used to reduce the risk of overfitting and improve the internal validity of the multivariate models. Although multivariable analyses were performed to account for potential confounding factors, the observational nature of the study precludes causal inference and residual confounding due to unmeasured variables cannot be entirely excluded.

6.3 | Recommendations for Further Research

Building on the clinical and nursing implications of the present findings, future studies should continue to explore the incidence and clinical progression of dysphagia in hospitalised older adults, incorporating extended follow-up during hospitalisation and after discharge. It is essential to integrate dysphagia screening systematically with nutritional and functional assessments, examining their combined predictive value for adverse outcomes such as malnutrition, respiratory infection, institutionalisation, readmission or mortality. The development and external validation of multivariate predictive models, followed by their evaluation in clinical practice through intervention studies at different levels of care, are recommended.

In addition, multicentre prospective studies are needed to assess the implementation, acceptability and impact of structured dysphagia screening protocols in nursing practice, including evaluations of feasibility, workload, resource requirements and sustainability across different healthcare settings. Research should also examine the effects of specific nurse-led interventions, both in hospital and in the transition to community care. Other potential lines of inquiry include the incorporation of assistive technologies, such as sensors, telemonitoring systems or digital tools, and the evaluation of training programmes aimed at strengthening nursing competence in the early detection and comprehensive management of dysphagia.

7 | Conclusion

The findings suggest that functional, cognitive, anthropometric and clinical vulnerability indicators may be relevant components of the initial assessment and clinical follow-up of hospitalised older adults, incorporating them into routine clinical practice. In particular, they support the potential value of systematic screening and reassessment approaches for dysphagia to respond to its dynamic clinical progression and promoting individualised, person-centred care.

The associations observed between dysphagia and variables such as calf circumference, functional dependence or cognitive impairment highlight the need for a comprehensive approach, not limited to specific pathologies, prioritising patients at higher clinical risk. In this context, nursing plays an essential role in early detection, continuous follow-up and coordination of interdisciplinary interventions, with the aim of reducing complications, optimising the length of hospital stay and improving the quality of care during and after hospitalisation. These findings should, however, be interpreted in light of the study limitations, including the observational nature of the design, the possibility of residual confounding, the dysphagia assessment strategy employed, and the availability of discharge data at follow-up.

Author Contributions

Cristina Carretero-Randez: conceptualization, methodology, validation, formal analysis, resources, data curation, writing – original draft, writing – review and editing, supervision, project administration. **María Isabel Orts-Cortés:** conceptualization, methodology, validation, resources, data curation, writing – review and editing, supervision, project administration, funding acquisition. **Lilia De Souza-Nogueira:** methodology, writing – review and editing, supervision. **Joaquín Moncho-Vasallo:** methodology, validation, formal analysis, writing – review and editing, supervision. **Rafaela Camacho-Bejarano:** conceptualization, methodology, resources, writing – review and editing, supervision.

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Statistical and Methodological Responsibility: A qualified statistician, Joaquín Moncho-Vasallo, is a member of the author team and contributed to the planning, execution and review of the statistical analyses. The authors confirm that the statistical methods were selected and applied appropriately in accordance with the study design and data characteristics. All procedures were rigorously implemented, and the results were accurately interpreted within the clinical and methodological framework. The authors confirm adherence to the statistical reporting guidelines recommended by *Nursing Open* and are committed to ensuring transparency and accuracy in the reporting of the findings. Artificial Intelligence (AI) Use Disclosure: OpenAI's ChatGPT was used to assist with English-language editing, syntax, and linguistic clarity of the manuscript. It was not used for data generation, statistical analysis, interpretation of results or scientific decision-making. All AI-assisted text was critically reviewed, edited and approved by the authors, who take full responsibility for the final content. ChatGPT was not listed as an author and does not assume responsibility for the work.

Ethics Statement

The project was approved by the Research Ethics Committee for Medicinal Products (CEIm) of the Alicante Health Department—General Hospital on 30 September 2020 (CEIm reference: PI2020-127; ISABIAL reference: 200026), as well as by the ethics committees of the participating hospitals. The research was conducted in accordance with current Spanish regulations on biomedical research, in particular Law 14/2007, of 3 July, on Biomedical Research, and Organic Law 3/2018, of 5 December, on the Protection of Personal Data and Guarantee of Digital Rights. Written informed consent was obtained from all participants or, when appropriate, from their legal representatives, following the provision of detailed information both verbally and in writing. This information included the purpose, scope, implications and possible risks of the study, as well as participants' right to withdraw at any time without providing justification. For people with disabilities, the information was adapted to accessible formats to ensure understanding and equal opportunities for participation. In cases where a participant was unable to read or write, consent was documented through legally recognised procedures that ensured that the participant's wishes were appropriately recorded. Furthermore, confidentiality and personal data protection were ensured through a pseudonymisation process, in accordance with the principles of data minimisation and security. Only the data strictly necessary to achieve the study objectives were collected. Throughout the research process, the ethical principles established in the Declaration of Helsinki and international guidelines on good practice in biomedical research were respected.

Consent

Written informed consent was obtained from all participants after receiving information about the study's objectives and procedures. The study adhered to the principles of the Declaration of Helsinki and complies with the EU General Data Protection Regulation (GDPR, Regulation EU 2016/679) and Spanish data protection law (Organic Law 3/2018). The authors confirm that the data utilised in this study were lawfully acquired and that no genetic resources covered by the Nagoya Protocol were used in this research.

Conflicts of Interest

The authors declare no conflicts of interest.

Data Availability Statement

The data that support the findings of this study are openly available in Zenodo at https://zenodo.org/records/14195477, reference number 14195477.

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Supporting Information

Additional supporting information can be found online in the Supporting Information section. **Figure S1:** Calibration plots for the multivariable models of suspected dysphagia (A) and diagnosed dysphagia (B). Calibration plots showing the agreement between predicted and observed probabilities for the multivariable models of suspected dysphagia (A) and diagnosed dysphagia (B). Observed proportions were estimated within deciles of predicted risk. The red line represents perfect calibration, the blue line corresponds to the LOESS-smoothed calibration curve and the shaded area indicates the 95% confidence interval. **Figure S2:** Scaled Schoenfeld residual plots for covariates with statistically significant covariate-specific tests in the Cox regression model. (A) Barthel index at admission (moderate dependence vs. independent). (B) FRAIL scale at admission (probable frailty vs. no frailty). Scaled Schoenfeld residuals are plotted against the Kaplan–Meier transformation of time. The solid line represents the smoothed trend of the residuals over time. **Data S1:** STROBE statement—Checklist of items that should be included in reports of cohort studies. This document provides the completed STROBE checklist for reporting this observational cohort study. **Table S1:** Classification of variables by group, type, measurement instrument and study event. This table provides a detailed classification of the study variables, including their type, data sources, measurement instruments and timing of assessment. **Table S2:** Baseline characteristics according to completion of discharge assessment status. This table compares the baseline characteristics of participants with and without discharge assessment data, including clinical, functional, cognitive, frailty, anthropometric and dysphagia-related variables. **Table S3:** Complete univariable and multivariable logistic regression models for suspected and diagnosed dysphagia. Complete univariable and multivariable logistic regression estimates are presented for both suspected and diagnosed dysphagia, including odds ratios (ORs), 95% confidence intervals (95% CIs) and *p*-values. The multivariable estimates corresponding to the final models are summarised in Table 3. **Table S4:** Complete Cox regression models for length of hospital stay. This table presents the complete unadjusted and adjusted Cox regression estimates for the variables evaluated in relation to time to hospital discharge, including hazard ratios (HRs), 95% confidence intervals (95% CIs) and *p*-values. The main adjusted model is summarised in Table 5. **Table S5:** Assessment of the proportional hazards assumption using Schoenfeld residual tests. Covariate-specific and global Schoenfeld residual tests for the final Cox regression model are presented, including chi-square statistics, degrees of freedom (df) and *p*-values. The global test evaluates the overall proportional hazards assumption, whereas covariate-specific tests assess potential time-dependent effects for individual predictors. **Table S6:** Sensitivity analyses for factors associated with length of hospital stay (Cox regression models). This table presents sensitivity analyses for the final Cox regression model, including complete-case analysis, multiple imputation analysis and best-case and worst-case scenarios. Hazard ratios (HRs), 95% confidence intervals (95% CIs) and *p*-values are reported to assess the robustness of the main findings under different assumptions regarding missing data.