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**VERSÃO EM PORTUGUÊS EUROPEU DO GUGGING SWALLOWING SCREEN-UNIDADES DE CUIDADOS INTENSIVOS:
FIABILIDADE E VALIDADE**

**EUROPEAN PORTUGUESE VERSION OF THE GUGGING SWALLOWING SCREEN-INTENSIVE CARE UNITS: RELIABILITY
AND VALIDITY**

**VERSIÓN EN PORTUGUÉS EUROPEO DEL GUGGING SWALLOWING SCREEN-UNIDADES DE CUIDADOS INTENSIVOS:
FIABILIDAD Y VALIDEZ**

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RESUMO

Introdução: A disfagia pós-extubação (PED) é uma complicação frequente da ventilação mecânica prolongada, aumentando o risco de aspiração e desnutrição. O rastreio precoce com ferramentas validadas é fundamental, especialmente quando não estão disponíveis avaliações instrumentais. Apesar de traduzido e adaptado para português europeu, o Gugging Swallowing Screen for Intensive Care Units (GUSS-ICU) não se encontra clinicamente validado.

Objetivo: Avaliar a fiabilidade e a validade concorrente da versão em português europeu da GUSS-ICU.

Métodos: Estudo transversal com 92 adultos em UCI em Portugal submetidos a ventilação mecânica por mais de 24 horas e elegíveis para ingestão oral. A GUSS-ICU foi aplicada dentro de uma hora após a extubação, seguida de avaliação clínica dentro de 24 horas. Foram avaliadas a fiabilidade interavaliadores e a precisão diagnóstica (sensibilidade, especificidade, ROC).

Resultados: A GUSS-ICU identificou disfagia em 76,1% dos participantes, contra 70,7% pela avaliação clínica. Com um ponto de corte de 10, apresentou alta precisão (AUC = 0,912), sensibilidade (75,9%) e especificidade (96,9%). As pontuações correlacionaram-se negativamente com a duração da intubação ($p = -0,353$, $p < 0,001$). A fiabilidade interavaliadores foi moderada ($\kappa = 0,533$).

Conclusão: Apesar das limitações metodológicas, o GUSS-ICU demonstrou concordância aceitável com a avaliação clínica estruturada da deglutição e fiabilidade interavaliadores moderada, justificando validação adicional com métodos instrumentais de referência.

Palavras-chave: transtornos da deglutição; unidade de cuidados intensivos; sensibilidade e especificidade; avaliação em enfermagem; rastreio

ABSTRACT

Introduction: Post-extubation dysphagia (PED) is a frequent complication of prolonged mechanical ventilation, increasing the risk of aspiration and malnutrition. Early screening with validated tools is essential, especially when instrumental assessments are unavailable. Although it has been translated and adapted into European Portuguese, the Gugging Swallowing Screen for Intensive Care Units (GUSS-ICU) has not been clinically validated.

Objective: To evaluate the reliability and concurrent validity of the European Portuguese version of the Gugging Swallowing Screen for Intensive Care Units (GUSS-ICU).

Methods: A cross-sectional study of 92 adult ICU patients in Portugal who received mechanical ventilation for over 24 hours and were eligible for oral intake. The GUSS-ICU was applied within one hour after extubation, followed by structured clinical swallowing evaluation within 24 hours. Inter-rater reliability and diagnostic accuracy (sensitivity, specificity, ROC) were assessed.

Results: GUSS-ICU identified dysphagia in 76.1% of patients, versus 70.7% by clinical evaluation. At a cut-off of 10, the instrument showed high accuracy (AUC = 0.912), sensitivity (75.9%), and specificity (96.9%). Scores negatively correlated with intubation duration ($p = -0.353$, $p < 0.001$). Inter-rater reliability was moderate ($\kappa = 0.533$).

Conclusion: Despite methodological limitations, GUSS-ICU showed acceptable agreement with structured clinical swallowing assessment and moderate inter-rater reliability, warranting further validation with instrumental reference standards.

Keywords: deglutition disorders; intensive care units; sensitivity and specificity; nursing assessment; screening

RESUMEN

Introducción: La disfagia posextubación (PED) es común tras ventilación mecánica prolongada y eleva el riesgo de aspiración y desnutrición. La detección precoz con herramientas validadas es clave, especialmente sin acceso a métodos instrumentales. Aunque se ha traducido y adaptado al portugués europeo, la escala Gugging Swallowing Screen for Intensive Care Units (GUSS-ICU) no cuenta con validación clínica.

Objetivo: Evaluar la fiabilidad y la validez concurrente de la versión en portugués europeo de la GUSS-ICU.

Métodos: Estudio transversal con 92 adultos ingresados en la UCI en Portugal sometidos a ventilación mecánica durante más de 24 horas y aptos para la ingestión oral. El GUSS-ICU se aplicó en el plazo de una hora tras la extubación, seguido de una evaluación clínica en el plazo de 24 horas. Se evaluaron la fiabilidad entre evaluadores y la precisión diagnóstica (sensibilidad, especificidad, ROC).

Resultados: La GUSS-ICU identificó disfagia en el 76,1 % de los participantes, frente al 70,7 % de la evaluación clínica. Con un punto de corte de 10, presentó una alta precisión (AUC = 0,912), sensibilidad (75,9 %) y especificidad (96,9 %). Las puntuaciones se correlacionaron negativamente con la duración de la intubación ($p = -0,353$, $p < 0,001$). La fiabilidad entre evaluadores fue moderada ($\kappa = 0,533$).

Conclusión: Pese a sus limitaciones metodológicas, GUSS-ICU mostró una concordancia aceptable con la evaluación clínica estructurada de la deglución y una fiabilidad entre evaluadores moderada, respaldando su futura validación mediante métodos instrumentales de referencia.

Palabras clave: trastornos de la deglución; unidades de cuidados intensivos; sensibilidad y especificidad; evaluación de enfermería; cribado

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INTRODUCTION

Validated screening tools play a critical role in the early identification of post-extubation dysphagia (PED) in ICU patients, particularly when instrumental assessments are not feasible. The Gugging Swallowing Screen for Intensive Care Units (GUSS-ICU) offers a structured, nurse-administered approach with demonstrated diagnostic accuracy in critical care settings (Troll et al., 2023). Although the GUSS-ICU has been translated and adapted into European Portuguese (Silva, 2022), it has not yet been clinically validated in a European Portuguese-speaking ICU population.

This study aimed to address this gap by evaluating the reliability and concurrent validity of the European Portuguese version of the GUSS-ICU, using structured clinical swallowing assessment as the reference assessment.

Intensive Care Units (ICUs) are high-acuity environments where critically ill patients often require invasive mechanical ventilation (IMV) via endotracheal intubation (ETI) to support compromised respiratory function (Kempker et al., 2020; Vincent, 2019). While essential for life support, IMV frequently leads to anatomical and functional disorders in the upper airway such as laryngeal sensory impairment, muscle deconditioning, and disrupted swallowing-breathing coordination, all of which predispose patients to post-extubation dysphagia (PED) (Dylczyk-Sommer, 2020; Johnson et al., 2018). PED refers specifically to the difficulty or inability to safely and effectively swallow food and liquids following the removal of an endotracheal tube. It is a form of oropharyngeal dysphagia that arises due to the physiological impact of prolonged intubation and mechanical ventilation (Rassameehiran et al., 2015).

Reported incidence ranges from 3% to over 80%, depending on patient characteristics, duration of intubation, assessment timing, and diagnostic methods used (Christensen & Trapl, 2018; Luo et al., 2024; Rassameehiran et al., 2015). Recent data show dysphagia prevalence declining from 86.7% within one hour post-extubation to 43.4% at 24 hours; risk factors include older age, cerebrovascular disease, prolonged ventilation, and larger tube size (Luo et al., 2024).

Importantly, PED is associated with serious downstream complications, namely aspiration pneumonia, malnutrition, dehydration, increased ICU length of stay, higher readmission rates, and elevated mortality (Elsayed et al., 2024; Zuercher et al., 2022). Early recognition and intervention have been shown to shorten hospital stay and improve clinical outcomes (Altman et al., 2010; Yang et al., 2023).

Given this clinical burden, structured screening programs using validated screening tools with rigorous psychometric properties are essential. Critically, validated tools empower non-specialist staff, especially nurses, to perform reliable screening where speech-language pathologists and other dysphagia specialists may not be readily available (Donovan et al., 2013; Perren et al., 2019; Teuschl et al., 2018). Cross-cultural adaptation of validated instruments is more efficient than developing new tools and ensures conceptual equivalence without duplicating effort when robust psychometric properties already exist (Alavi et al., 2025). In ICU settings, nurse-led bedside swallowing screening implemented systematically within hours post-extubation has demonstrated feasibility and predictive validity for adverse outcomes (Schefold et al., 2017). Expert consensus favors a two-step approach: initial bedside screening followed by confirmatory instrumental assessment (e.g. Fiberoptic Endoscopic Evaluation of Swallowing), using standardized protocols designed for critical care practice (Perren et al., 2019). In stroke populations, the use of validated tools such as the Gugging Swallowing Screen (GUSS) reduced the incidence of pneumonia by up to ~40%, highlighting the value of validated, high-precision instruments (Teuschl et al., 2018). The original GUSS has already been translated and validated for European Portuguese in stroke populations (Oliveira et al., 2021).

The GUSS-ICU recently underwent validation against Fiberoptic Endoscopic Evaluation of Swallowing, yielding sensitivity rates of 89–92%, specificity of 67–89%, and strong inter-rater reliability (Cohen's $\kappa \approx 0.84$), confirming that it is both robust and feasible for multi-consistency bedside screening in critically ill patients (Troll et al., 2023).

Despite existing clinical tools, there has been no clinical validation of GUSS-ICU in European Portuguese. This study therefore addresses this gap directly.

1. METHODS

This cross-sectional methodological study was conducted between October 2023 and May 2024 in two ICUs in the northern region of Portugal. The study aimed to provide clinical validation evidence for the European Portuguese version of the GUSS-ICU by examining two measurement properties: inter-rater reliability and concurrent validity. Inter-rater reliability was assessed by comparing the GUSS-ICU classifications obtained independently by two ICU nurses. Concurrent validity was assessed by comparing GUSS-ICU results with an independent structured bedside clinical swallowing evaluation performed by a rehabilitation nurse with advanced training in dysphagia management.

The translation, cross-cultural adaptation, and content validation of the European Portuguese version of the GUSS-ICU were previously performed by Silva (2022), following internationally recommended procedures for cross-cultural adaptation. The process included forward translation, back-translation, expert panel review, and cognitive debriefing/pre-testing. Semantic, idiomatic, cultural, and conceptual equivalence were examined, and some items were modified from their literal wording to improve equivalence in the European Portuguese context. The pre-testing phase was used to verify whether the translated items,

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instructions, and response procedures were understandable and appropriate for the target context. Content validity was then assessed by specialists, with acceptable content validity indices reported for the instrument dimensions.

Methodological principles were informed by COSMIN recommendations for reliability and validity studies (Mokkink et al., 2019). Instrumental assessments, such as videofluoroscopic swallowing study (VFSS) and flexible endoscopic evaluation of swallowing (FEES), are considered reference methods for dysphagia diagnosis. However, these methods were not feasible as systematic reference assessments in the participating ICUs because of limited availability and clinical constraints. Therefore, a structured clinical swallowing evaluation was used as the reference assessment for concurrent validity, in line with pragmatic validation approaches used for nurse-administered swallowing screening tools (Jiang et al., 2016).

1.1 Sample

Participants were recruited through convenience sampling from the two ICUs, totaling 92 patients: 49 from the first ICU and 43 from the second. Inclusion criteria were age ≥ 18 years, IMV for more than 24 hours, and clinical stability allowing safe initiation of oral intake after extubation. For the purposes of this study, clinical stability was defined as: adequate alertness and ability to follow simple instructions; absence of signs of acute respiratory distress; hemodynamic stability, with no need for initiation or escalation of vasoactive support; stable oxygenation and respiratory support requirements; and confirmation by the attending clinical team that a swallowing screening assessment and oral trials could be safely performed. This definition was intended to ensure that participants were sufficiently alert and physiologically stable to undergo swallowing screening, while reflecting routine ICU decision-making regarding readiness for post-extubation oral intake. Patients with a medical history of dysphagia were excluded. Potential clinical factors that could influence swallowing function were recorded from the clinical records, including reason for ICU admission, severity scores, duration of IMV, duration of endotracheal intubation, sedation time, and length of ICU stay. Neurological diagnosis was not used as an exclusion criterion, as the objective was to validate the GUSS-ICU in a clinically representative ICU population after extubation. However, the reason for ICU admission, including neurological pathology when present, was recorded to characterize the sample and support interpretation of the findings.

Sample size was determined based on recommendations for diagnostic accuracy studies and reliability testing, which suggest a minimum of 50 to 100 participants to ensure stable estimates of sensitivity, specificity, and inter-rater reliability (Bujang & Adnan, 2016; Mokkink et al., 2019). Although no formal a priori sample size calculation was performed, the final sample of 92 patients was consistent with these recommendations and was considered sufficient to support method comparison, agreement analysis, and preliminary estimates of the psychometric properties of the European Portuguese version of the GUSS-ICU.

1.2 Data collection instruments

Data were collected using a structured questionnaire divided into two sections. The first section included sociodemographic and clinical variables: sex, age, reason for ICU admission, duration of IMV, duration of endotracheal intubation, total sedation time, length of ICU stay, and severity scores (Acute Physiology and Chronic Health Evaluation II [APACHE], Simplified Acute Physiology Score II [SAPS II], as well as the Sequential Organ Failure Assessment [SOFA] at admission) on the day the GUSS-ICU was administered. The second section comprised the GUSS-ICU assessment. The instrument consists of two components. The first is an indirect swallowing evaluation with six items: Richmond Agitation-Sedation Scale (RASS), presence of laryngeal stridor, ability to cough or clear the pharynx, ability to swallow saliva, anterior oral leakage, and voice quality after swallowing saliva. A score of six points was required to proceed to the second part. The direct swallowing assessment follows a standardized order with four subtests of different consistencies. For each subtest, swallowing time, oral leakage, coughing, and voice changes were assessed. Normal performance on a subtest scored one point, and abnormal signs (e.g., prolonged oral phase >10 seconds for liquids or >23 seconds for solids, coughing, leakage, or altered voice) scored zero, leading to discontinuation of the assessment. The maximum possible score is 10 points, indicating normal swallowing function and no or low aspiration risk. Lower scores indicate higher risk and guide nursing interventions or referral to advanced clinical evaluation (0-6: severe dysphagia with high aspiration risk; 7: moderate dysphagia with aspiration risk; and 8-9: mild dysphagia with low aspiration risk) (Troll et al., 2023). The GUSS-ICU assessments were performed by ICU nurses from each participating unit. Before data collection, all nurse assessors received standardized training on the European Portuguese version of the GUSS-ICU. This training included a review of the instrument structure, item definitions, scoring procedures, stopping criteria, safety procedures during direct swallowing trials, and completion of the data collection form. Each participant was initially screened with the GUSS-ICU by one ICU nurse. For inter-rater reliability, a second ICU nurse, blinded to the first screening result, repeated the assessment within 24 hours. The clinical evaluator was blinded to both GUSS-ICU results. No additional pre-test of item comprehension was conducted with the clinical validation sample, as the European Portuguese version had already undergone cognitive debriefing/pre-testing during the previous cross-cultural adaptation phase and the GUSS-ICU is a nurse-administered observational screening tool rather than a self-administered patient questionnaire.

The reference evaluation was performed by a rehabilitation nurse with advanced training in dysphagia management, more than 5 years of clinical experience in critical care, and routine involvement in dysphagia assessment and intervention. The clinical

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swallowing evaluation followed a structured bedside protocol covering cognitive and communication status, oral motor function, sensory responsiveness of oral structures, secretion management, voluntary cough, voice quality, and cranial nerve screening relevant to swallowing. Functional swallowing trials were then performed using different food and liquid consistencies, with systematic observation of clinical signs suggestive of dysphagia, including delayed swallow initiation, coughing or throat clearing, wet or altered voice quality, oral leakage, oral residue, suspected pharyngeal residue, respiratory changes, or clinical signs of reduced airway protection. Food and liquid consistencies were prepared and recorded according to the standardized procedures used in the participating ICUs; these were described using common clinical categories of liquid, semi-solid/puréed, and solid consistencies.

Sociodemographic and clinical data were collected by trained members of the research team from each ICU. Data sources included patients' clinical records and, when appropriate, information obtained directly from the patients. The same researchers were responsible for recording the data in a structured data collection form. Each participant was assigned a unique study code at the local ICU level, and direct identifiers were removed before data transfer. The coded dataset, containing no directly identifiable information, was then provided to a member of the research team who was not involved in patient recruitment or data collection and who conducted the statistical analyses.

1.3 Statistical analysis

The validation analysis focused on two predefined measurement properties: concurrent validity, examined through diagnostic accuracy estimates using the structured clinical swallowing evaluation as the reference assessment, and inter-rater reliability, examined through agreement between the two ICU nurse assessors.

Diagnostic accuracy was assessed by calculating sensitivity, specificity, positive predictive value, negative predictive value, Youden's index, and the area under the receiver operating characteristic curve (AUC). The AUC was reported with its 95% confidence interval calculated using the ROC analysis procedure implemented in Jamovi 2.3.28. Candidate cut-off points were obtained from the ROC analysis output generated by Jamovi 2.3.28, and the optimal cut-off was identified using Youden's index. Inter-rater reliability was assessed using Cohen's kappa (κ), also reported with its 95% confidence interval, and interpreted according to Landis and Koch benchmarks (Landis & Koch, 1977) (<0.20: slight; 0.21–0.40: fair; 0.41–0.60: moderate; 0.61–0.80: substantial; >0.80: almost perfect agreement). Statistical analyses were conducted using Jamovi 2.3.28. Significance was set at $p < 0.05$.

All procedures performed in this study involving human participants were in accordance with the ethical standards of the institutional research committee and with the 1964 Helsinki Declaration and its later amendments.

Authorization from the authors of both the original GUSS-ICU and the translated and adapted European Portuguese version was obtained. The study protocol was approved by the ethics committees of both hospitals (51/2023 and 178/2023-1). Written informed consent was obtained from all participants or their legal representatives.

2. RESULTS

A total of 92 patients were enrolled in the study. Table 1 presents the participants' characteristics:

Table 1 – Participants' characteristics

Variables		UCI 1		UCI 2		Total	
Age (years) range		61.12±15.68 25-86		57.23±14.60 21-84		59.4±15.2 21-86	
Sex	Male	n	%	n	%	n	%
	Female	33	67,3	24	55,8	57	62,0
Reasons for ICU admission [†]	Neurological conditions	16	32,7	19	44,2	35	38,0
	Sepsis	11	22,5	9	25,7	20	23,8
	Respiratory diseases	8	16,3	11	31,5	19	22,6
	Trauma	13	26,6	4	11,4	17	20,2
	Cardiovascular disease	6	12,2	4	11,4	10	11,9
	Other reasons (post-operative status, gastrointestinal, metabolic, and hematologic disorders)	5	10,2	2	5,7	7	8,3
		6	12,2	5	14,3	11	13,2

[†]Data missing from 10 participants

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Further clinical data related to the participants are detailed in Table 2:

Table 2 – Clinical variables

Variables	Missing (n)	ICU 1 Mean±(SD) [†] Range	ICU 2 Mean±(SD) [†] Range	Total Mean±(SD) [†] Range
IMV duration (days)	4	7.82±6.68 1-28	8.68±6.74 1-25	8.21±6.69 1-28
Endotracheal intubation duration (days)	4	7.84±6.66 1-28	8.68±6.75 1-25	8.22±6.67 days 1-28
Sedation time (days)	5	5.65±5.41 1-22	7.97±6.16 1-23	6.70±5.85 days 1-23
Length of stay (days)	5	8.51±6.51 1-28	9.95±7.02 1-26	9.2±6.7 days 1-28
APACHE II	34	18.59±8.89 3-43	19.64±5.87 10-27	18.78±8.39 3-43
SAPS II	35	43.88±19.20 12-100	48.60±10.84 29-65	44.68±18.07 12-100
SOFA	36	6.96±3.67 2-14	7.22±3.30 3-14	7.00±3.59 2-14

[†] Standard Deviation

Comparisons between the two ICUs indicated no significant differences in sociodemographic or clinical characteristics. Continuous variables, including age, duration of mechanical ventilation, endotracheal intubation, sedation time, ICU length of stay, and severity scores (APACHE II, SAPS II, and SOFA), were assessed using the Mann–Whitney U test, and no statistically significant differences were observed (all $p > 0.05$). Similarly, categorical variables, such as sex and primary reason for ICU admission, were compared using the Chi-square test, which also revealed no significant differences between the two units ($p > 0.05$). These results suggest that both cohorts were comparable at baseline.

Of the 92 patients assessed, the proportion of participants classified as having dysphagia was 76.1% ($n = 70$) according to the GUSS-ICU and 70.7% ($n = 65$) according to the structured clinical swallowing evaluation. Among those with a positive GUSS-ICU result, 38 patients (54.3%) were classified as having severe dysphagia with high aspiration risk, 20 (28.6%) as moderate dysphagia, and 12 (17.1%) as mild dysphagia with low aspiration risk. All patients underwent clinical evaluation within 24 hours of the initial screening. The mean interval between the first and second GUSS-ICU assessments was 5.7 ± 6.7 hours, ranging from 0.5 to 23.5 hours.

No statistically significant correlations were observed between GUSS-ICU scores and sociodemographic or clinical variables, except for a negative correlation with the duration of endotracheal intubation (Spearman's $\rho = -0.353$, $p < 0.001$), indicating that longer intubation times were associated with lower swallowing scores.

Agreement between GUSS-ICU and the clinical reference standard was statistically significant ($\chi^2 = 58.2$; $p < 0.001$). The receiver operating characteristic (ROC) analysis yielded an area under the curve (AUC) of 0.912 (95% CI: 0.843–0.981), indicating excellent discriminatory ability of the GUSS-ICU for identifying dysphagia (Figure 1).

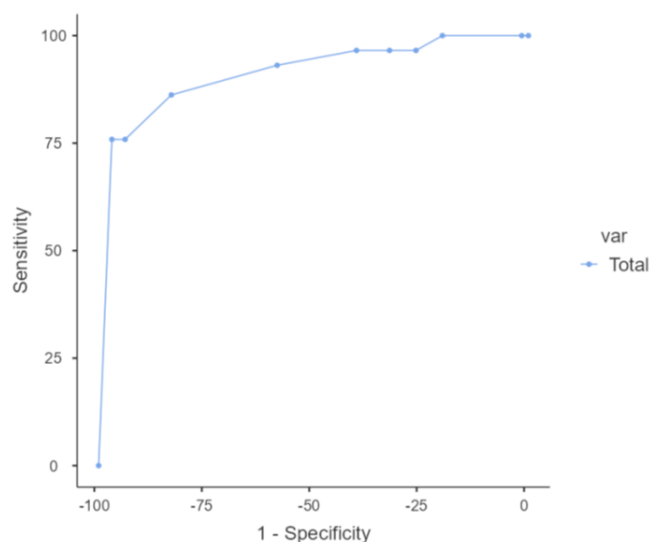


Figure 1 – ROC curve for GUSS-ICU in predicting dysphagia, using clinical evaluation as the reference assessment (Jamovi©)

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Cut-off analyses demonstrated varying trade-offs between sensitivity and specificity (Table 3). Candidate cut-off points generated by the ROC analysis were examined using Youden's index. The highest Youden's index ($J = 0.728$) was observed at a cut-off of 10, suggesting that this threshold provided the best overall balance between sensitivity and specificity in this sample.

Table 3 – Diagnostic Accuracy of GUSS-ICU at Different Cut-Off Scores

Cut-off	Sensitivity (%)	Specificity (%)	PPV (%)	NPV (%)	Youden's Index
8	86.21	83.08	69.44	93.10	0.693
9	75.86	93.85	84.62	89.71	0.697
10	75.86	96.92	91.67	90.00	0.728

PPV – Positive predictive value

NPV – Negative predictive value

The inter-rater reliability between the two ICU nurses using the GUSS-ICU was moderate, with a Cohen's κ of 0.533 (95% CI: 0.402–0.666).

3. DISCUSSION

This study demonstrated that the European Portuguese version of the GUSS-ICU is a valid and reliable tool for screening PED in critically ill patients. The instrument showed a high level of agreement with the structured clinical swallowing evaluation, with an AUC of 0.912, high specificity, moderate-to-high sensitivity across the examined cut-off points, and a strong negative predictive value, supporting its potential clinical utility for early dysphagia screening in this ICU sample.

Inter-rater reliability was moderate ($\kappa = 0.533$), indicating that agreement between nurse assessors was only partial and that some variability in GUSS-ICU classification occurred. In clinical terms, this finding suggests that although the instrument can support structured dysphagia screening in ICU settings, its implementation should be accompanied by standardized training, clear scoring guidance, and periodic calibration among assessors. This is particularly relevant because differences in scoring may influence decisions about oral intake, aspiration risk management, and referral for specialist or instrumental assessment.

Results are consistent with findings from the original validation of GUSS-ICU, which reported AUC values around 0.923, sensitivity up to 94%, and specificity between 67% and 89% when benchmarked against Fiberoptic Endoscopic Evaluation of Swallowing (Troll et al., 2023). The inter-rater reliability observed in this study was lower than that reported in the original validation of the GUSS-ICU ($\kappa \approx 0.84$) (Troll et al., 2023). Several factors may have contributed to this difference. First, the interval between nurse assessments was variable, and swallowing function may improve or fluctuate rapidly after extubation. Second, ICU patients are clinically unstable relative to other dysphagia-screening populations, with changes in alertness, respiratory status, secretion management, fatigue, and airway protection potentially affecting performance between assessments. Third, although nurse assessors received standardized training, the moderate κ suggests that additional practical calibration, case-based training, or competency assessment may be needed before routine implementation.

The diagnostic performance observed in this study should be interpreted in light of potential spectrum and reference-standard bias. The sample included critically ill post-extubation patients at high risk of dysphagia, which may limit generalizability to less severe cases. Additionally, as the reference standard was a bedside clinical evaluation rather than a gold standard, sensitivity and specificity may reflect agreement with clinical judgement rather than true diagnostic accuracy. Clinical assessment may miss silent aspiration and overlap with GUSS-ICU items, potentially contributing to assessor bias. Therefore, findings support the tool's use in this context but should be confirmed in more heterogeneous samples and with instrumental reference standards.

The proportion of participants classified as having dysphagia was 76.1% according to the GUSS-ICU and 70.7% according to the structured clinical swallowing evaluation. These values are higher than the pooled incidence of approximately 36% reported in recent meta-analyses of general ICU populations (Yu et al., 2024), but are consistent with studies performing early post-extubation assessments. Luo et al. (2024) reported dysphagia rates of 86.7% at 1 hour, 63.0% at 4 hours, and 43.4% at 24 hours after extubation, indicating that assessment timing strongly influences reported prevalence. The early screening performed in our study likely captured transient swallowing impairments that may have improved within the first 24 hours.

The high incidence of PED and its association with complications such as aspiration pneumonia, malnutrition, prolonged ICU stay, and increased mortality (Bertschi et al., 2025; Zuercher et al., 2022) underscore the need for systematic screening. Despite this, recent surveys indicate that structured dysphagia screening protocols are still underused in many ICUs (Perren et al., 2019). Our findings reinforce the importance of validated, nurse-administered tools like GUSS-ICU, which enable early identification and timely interventions. The high negative predictive value observed in this sample (up to 93.1%) suggests potential usefulness for identifying patients less likely to have dysphagia according to structured clinical assessment. However, this interpretation should remain cautious because predictive values are influenced by dysphagia prevalence and by the high-risk clinical profile of the sample.

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This study highlights the benefit of translating and adapting validated instruments rather than developing new tools. Cross-cultural adaptation preserves the original conceptual framework and psychometric rigor while ensuring cultural and linguistic appropriateness, as recommended by COSMIN standards (Mokkink et al., 2019). This strategy accelerates implementation in diverse healthcare systems without duplicating efforts.

Routine use of GUSS-ICU can enhance dysphagia recognition in ICUs, where specialist availability is often limited. Early screening fosters clinical awareness and multidisciplinary intervention, which may prevent complications and improve patient outcomes. Evidence from stroke populations demonstrates that systematic screening reduces pneumonia rates by up to 40% (Teuschl et al., 2018), and while comparable ICU-specific trials are limited, it is plausible that similar benefits occur in critical care settings.

Our study has several limitations. First, it was conducted in two ICUs within the same region, which may limit generalizability to other institutions, case-mix profiles, and models of dysphagia care. Second, the absence of instrumental confirmation with VFSS or FEES is a major methodological limitation. Although the use of a structured bedside clinical swallowing evaluation reflected the diagnostic pathway available in the participating ICUs, clinical assessment cannot directly visualize swallowing physiology, detect penetration or aspiration with the same accuracy as instrumental methods, or reliably identify silent aspiration. Therefore, estimates of sensitivity, specificity, and AUC should be interpreted as indicators of agreement with an expert clinical reference assessment rather than definitive diagnostic accuracy against a gold standard. This limitation is particularly relevant in critically ill post-extubation patients, in whom airway protection, secretion management, respiratory-swallow coordination, and fatigue may fluctuate over short periods.

Third, potential confounding factors may have influenced swallowing performance and screening results. Neurological pathology is especially relevant because cerebrovascular disease, traumatic brain injury, neuromuscular impairment, impaired consciousness, and cranial nerve involvement may independently contribute to dysphagia, irrespective of intubation-related mechanisms. Although reason for ICU admission and relevant clinical variables were recorded to characterize the sample, neurological pathology was not used as an exclusion criterion because the aim was to validate the GUSS-ICU in a clinically representative ICU population. However, the sample size did not allow robust stratified or adjusted analyses by diagnostic subgroup. Consequently, the extent to which diagnostic performance differs between neurological and non-neurological ICU patients remains uncertain.

Finally, the interval of up to 24 hours between the two GUSS-ICU assessments may have allowed clinical changes in some patients, potentially influencing inter-rater reliability estimates. This is particularly important because post-extubation swallowing function may improve rapidly during the first 24 hours. To minimize this risk, the second assessment was performed as close as clinically feasible to the first assessment and only when the patient remained clinically stable.

The COSMIN framework informed the methodological orientation of this study, particularly regarding reliability and concurrent validity. Nevertheless, not all COSMIN standards could be fully operationalized in this clinical context. In particular, the absence of an instrumental reference standard, the use of convenience sampling, the limited sample size for subgroup analyses, and the variable interval between repeated assessments should be considered when judging the strength of the evidence. Accordingly, the present findings should be interpreted as initial clinical validation evidence for the European Portuguese GUSS-ICU, rather than as definitive confirmation of its diagnostic performance across all ICU populations.

Future research should focus on multicenter validation studies including instrumental assessments to confirm diagnostic accuracy across settings. Investigations into the optimal timing for screening and the impact of GUSS-ICU implementation on patient outcomes, such as pneumonia incidence, oral feeding resumption, and length of stay, are warranted. Additionally, structured training programs for ICU nurses should be evaluated to strengthen inter-rater reliability and facilitate widespread adoption.

CONCLUSION

This study provides initial evidence supporting the potential use of the European Portuguese version of the GUSS-ICU as a nurse-administered dysphagia screening tool in ICU patients after extubation. The findings suggest acceptable agreement with structured clinical swallowing assessment and moderate inter-rater reliability when the instrument is administered by trained ICU nurses. However, these results should be interpreted in light of the study's methodological limitations, particularly the absence of instrumental confirmation with VFSS or FEES, the use of convenience sampling, the inclusion of patients with heterogeneous clinical diagnoses, and the single-region two-ICU setting. Therefore, the findings should not be generalized beyond similar ICU contexts without further validation. Future multicenter studies using instrumental reference standards are needed to confirm diagnostic accuracy, evaluate performance across diagnostic subgroups, and strengthen evidence for broader clinical implementation.

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AUTHORS' CONTRIBUTION

Conceptualization, S.C. and I.J.O.; data curation, I.J.O.; formal analysis, S.C., J.V.P. and I.J.O.; investigation, S.C., J. V.P., F.B., P.A. and I.J.O.; project administration, S.C.; supervision, P.A. and I.J.O.; validation, P.A. and I.J.O.; writing – original draft, S.C., J.V.P., F.B., P.A. and I.J.O.; writing – review & editing, S.C., J. V.P., F.B., P.A. and I.J.O.

CONFLICT OF INTERESTS

The authors declare no conflict of interests.

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