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RESEARCH ARTICLE

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Identifying dysphagia in the intensive care unit: Validation of the Swedish version of the Gugging swallowing screen—Intensive care unit

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Abstract

Background: Dysphagia is independently associated with adverse outcomes in intensive care units (ICU). Early identification through dysphagia screening does not occur routinely, negatively impacting optimal patient management. This study aimed to validate the Swedish version of the Gugging Swallowing Screen—Intensive Care Unit (*GUSS-IVA*).

Methods: This is a prospective multicentre study of 56 adult ICU patients with endotracheal intubation exceeding 48 h at three hospitals in Sweden. The GUSS-ICU was translated into Swedish (GUSS-IVA) and used to screen all prolonged intubated patients (>48 h) once extubated. The GUSS-IVA screen was conducted by ICU nursing staff and then compared with a gold standard Flexible Endoscopic Evaluation of Swallowing (FEES) within 2 h of the GUSS-IVA screen. Fifty-one of 56 patients underwent FEES (where assessors were blinded to the GUSS-IVA screen results). Sensitivity and specificity were calculated, as was the area under the receiver operating characteristic curves (AUC) with 95% confidence intervals (CI). For inter-rater

reliability, within 2 h of the initial screen, 29/56 patients were GUSS-IVA screened a second time by a nursing staff blinded to the first GUSS-IVA results.

Results: Among the 56 patients, 38 (67.9%) were identified as dysphagic using the GUSS-IVA screen. With FEES, 42 of 51 patients (82.4%) were diagnosed with dysphagia; of these, 16 (31.4%) were classified as aspirating. Compared to FEES, GUSS-IVA showed high sensitivity and specificity values (81% and 89%, respectively) with an AUC of 0.85 (95% CI: 0.71–0.95) and a positive predictive value of 97%. High convergent validity was obtained for GUSS-IVA compared with the Dysphagia Outcome Severity Scale ($\phi = 0.57$, $p < .001$) and the Functional Oral Intake Scale ($\phi = 0.52$, $p < .001$) and moderate validity with the Penetration-Aspiration Scale ($\phi = 0.30$, $p = .033$). The inter-rater reliability showed moderate agreement (Cohen's kappa $\kappa = 0.501$, $p = .006$).

Conclusions: This study indicates that the Swedish GUSS-IVA is a valid and reliable screen to identify dysphagic ICU patients. Given the negative impact of dysphagia on short and long-term patient outcomes, the Swedish GUSS-IVA is recommended as an essential first step by nursing staff for early identification of dysphagia for further diagnostics and subsequent patient management.

KEYWORDS

aspiration pneumonia, critical care, critical illness, oropharyngeal dysphagia

Editorial Comment

Dysphagia is common in adult intensive care patients and is an independent predictor of mortality. Despite this, dysphagia remains an often overlooked medical condition. These findings support the idea that systematic assessment for possible dysphagia in all intensive care patients is meaningful.

1 | INTRODUCTION

Approximately 40%–60% of intensive care unit (ICU) patients in Sweden experience respiratory failure requiring mechanical ventilation, often initially achieved via endotracheal intubation.[1] Although endotracheal intubation sometimes is a necessary, life-saving procedure, it is associated with complications that persist after extubation including, but not limited to, swallowing dysfunction (i.e., dysphagia).[2,3] Post-extubation dysphagia is a common condition with a varied prevalence, depending on the timing and method of dysphagia assessment. Most recent meta-analyses indicate a pooled incidence and combined weighted incidence of 36% and 41%, respectively.[4,5] In contrast, the prospective DYnAMICS study by Schefold et al.[6] found a lower incidence of 18% when systematically screening for dysphagia using a water swallow test in a large, multicentre cohort across multiple mixed ICUs.

Dysphagia is defined as an impairment in the process of swallowing, affecting the efficacy and safety of transferring food, liquids, saliva, and medications from the oral cavity through the pharynx and oesophagus to the gastric entrance.[7,8] Dysphagia not only negatively impacts patient and clinical outcomes within the ICU but can also persist long after ICU discharge. It is associated with poor oral intake, aspiration of food or liquids, aspiration-related pneumonia, malnutrition, dehydration, re-intubation, prolonged mechanical ventilation, and can negatively impact tracheostomy-weaning and ICU/hospital lengths of stay.[9] Additionally, dysphagia contributes to delayed recovery, reduced quality of life, and higher short-term (28 days) and mid-term (90 days) mortality rates.[2,6,8–11]

Six mechanisms for post-extubation dysphagia in ICU patients have been identified: injury to the upper airway (particularly the larynx/pharynx), neuromuscular weakness, altered laryngeal/pharyngeal sensation, impaired cognition, gastroesophageal reflux, and dyssynchronous breathing and swallowing.[7] These factors, in combination with the presence of ICU-acquired weakness with muscle atrophy, may additionally affect swallowing function after extubation.[12] Despite this, guidelines for dysphagia management are lacking, and routine screening or follow-up diagnostic instrumental assessments are rarely used.[13] The awareness of dysphagia in ICU patients is limited among ICU clinicians. It is, therefore, recommended that validated screening tools be routinely adopted within ICUs to earlier identify and better manage dysphagia.[6,11,13–15]

A dysphagia screen is recommended as the first step in dysphagia identification. Screening should occur before gold-standard instrumental assessments,[8,16,17] which require specially trained personnel and incur greater costs. Few dysphagia screening tools validated for critically ill patients exist, and the sensitivity and specificity of existing tools vary widely.[18–22] The Gugging Swallowing Screen—Intensive Care Unit (GUSS-ICU)[18,19] is one dysphagia screen that has high validity (sensitivity 91.7%–94.4%, specificity 66.7%–88.9%) for the ICU

population. It is a pragmatic, easy-to-use screening tool for detecting dysphagia, available in two versions[18,19]: one using only water in part two of the screen, the direct swallow test,[18] and another using multiple consistencies in part two.[19]

There are currently no best practice guidelines for dysphagia management in ICUs in Sweden and no screening tool in Swedish to ensure early dysphagia identification. This study aimed to translate the GUSS-ICU[19] (English version) to Swedish and then validate the Swedish translation (now referred to as *GUSS-IVA*). The original GUSS-ICU version,[18] using water only (rather than multiple consistencies), is used in this study since the later version[19] was not available when this research commenced.

2 | METHODS

2.1 | Study design and participants

This prospective multicentre study involving Swedish-speaking adult (≥18 years) patients was conducted across three mixed-ICUs in Sweden (two regional- and one university hospital) with heterogenic ICU populations, between April 2022 and February 2024. Inclusion criteria were conscious patients who could provide informed consent, intubated for >48 h (including those requiring continued mechanical ventilation via tracheostomy tube) and who had waited for 24 h post-extubation in accordance with the test criteria.[18] Excluded patients were those with previously diagnosed dysphagia, cognitive impairment, and those unable to sit for at least 15 min with 45° bedhead elevation (for the FEES examination). This research was approved by the Swedish Ethical Review Authority (2019–06546) and all participants provided written informed consent before study inclusion.

2.2 | Procedure

All patients meeting inclusion criteria were consecutively identified by a research nurse. Patients were informed about the study, and if they agreed to participate, the study coordinator was then contacted. The coordinator identified the nurse or assistant nurse who was directly involved in the patient's daily care, and an explanation and demonstration of the *GUSS-IVA* procedure were given. No formal *GUSS-IVA* training was conducted before the commencement of the current study. The screen was performed by one person only. To evaluate inter-rater reliability, a second GUSS-IVA screening was conducted within 1 h by another ICU nurse or nurse assistant, blinded to the initial screening results. The assessment results were documented in a case report form. Clinical information was obtained from medical records, including age, sex, admission diagnoses, and intubation time.

2.3 | Screening with *GUSS-IVA*

GUSS-ICU was translated into Swedish using a forward-backward multistep process. Details of the translation process and the English and Swedish versions can be found in the supplementary files 1, 3 and 4. Similar to the original GUSS-ICU, the Swedish *GUSS-IVA* consists of an observational test and a direct swallow test.[18,21] The observational test consists of 10 items: Intubation >48 h, extubation >24 h, level of alertness (Richmond Agitation Sedation Scale: ±0 and + 1[23]), absence of confusion (a negative result on the Confusion Assessment Method for the ICU[24] or <2 on the Nursing Delirium Screening Scale[25]), nasogastric feeding tube in situ (or no tube), ability to cough, ability to swallow saliva. Each item is evaluated and rated by the assessor with 1 point for yes/present and zero for no/not present. A further three items, indicating the presence of stridor, drooling, and voice change, are oppositely rated. If the maximum of 10 points is not obtained in part one (observational test), the test is failed and the patient is kept *nil by mouth* for the next 4 h. After this period, a repeated screening is recommended. A score of 10 points allows continuation to part two, which is the direct swallow test. Part two consists of five sequential swallow tests in a fixed order, starting with a 3 mL water swallow test, followed by careful observation. The assessment is terminated if the following signs of dysphagia/aspiration are observed: no/delayed swallowing, coughing, drooling, or voice changes. If these risk signs are not observed, the test continues with a gradual increase in water amounts to 5, 10, 20, and 50 mL, with careful observation between each increase. In the current study, the water swallow test was administered to participants using a spoon or a cup for small volumes (3, 5, and 10 mL) and a cup for larger volumes (20 and 50 mL). All volumes were pre-measured with a syringe to ensure accuracy. A successful swallow test scores one point, and a failed test zero points. If a patient passes the direct swallow test, they are recommended to proceed with thin liquids and a soft/easy to chew diet (IDDSI 0 and IDDSI EC7, respectively).[26] If the patient fails the direct swallow test, they are recommended to be kept *nil by mouth* and referral to a speech-language pathologist (SLP) is advised.

2.4 | FEES examination

Within 2 h of the *GUSS-IVA* screening, a FEES assessment was conducted to complete dysphagia diagnostics. FEES was used as the reference standard to validate *GUSS-IVA* due to FEES being (a) considered a gold-standard assessment for dysphagia and (b) able to be performed bedside in the ICU.[27–30] Six experienced SLPs, working in pairs, performed and evaluated the FEES (two in each participating ICU) at the bedside according to a standardized protocol.[30] No topical anaesthesia was used during the assessment. The SLPs performing FEES were blinded to the patient's *GUSS-IVA* results and medical records. The FEES was carried out using endoscopy systems (Supplementary File 2).

Three consistencies were tested: IDDSI levels 0, 3, and 7 according to the International Dysphagia Diet Standardisation Initiative (IDDSI) framework.[26] Boluses were tinted with green or blue food colouring to improve visibility during the examination. The protocol began with administering three teaspoons of liquid and then three more tablespoons of the same consistency (IDDSI 0) followed by semi-solids (IDDSI 3) in a consecutive sequence. The patient was then

instructed to chew and swallow a piece of a cracker (IDDSI 7). The protocol was modified or ceased if significant aspiration or other respiratory symptoms posed a risk to patient safety.

Based on the FEES, dysphagia was classified according to the Dysphagia Outcome Severity Scale (DOSS) scoring system.[31] A cut-off of DOSS ≤5 indicates the presence of dysphagia. DOSS is a dysphagia severity scale ranging from 1 to 7, where 1 indicates severe dysphagia and 7 normal swallowing function. The scale includes aspects of swallow safety (i.e., airway protection) and efficiency (i.e., bolus transport and pharyngeal retention). Airway compromise (risk for or visualized aspiration) was defined as a score of ≥5 according to the Penetration-Aspiration Scale (PAS).[32] The PAS ranges from 1 to 8, where 1 indicates no penetration or aspiration and 8 aspiration to the airways without any clearing attempt (silent aspiration). Based on the FEES assessment, the examiner also rated the patient's functional ability to eat and drink according to the Functional Oral Intake Scale (FOIS).[33] FOIS ranges from 1 to 7, where 1–3 indicates non-oral feeding, 4–6 oral feeding with various restrictions, and 7 oral diet without restrictions.

2.5 | Statistical analysis

Criterion validity was assessed by comparing the *GUSS-IVA* screening results with the FEES examination and calculating sensitivity, specificity (as percentage), and the area under the receiver operating characteristic curves (AUC) with 95% confidence intervals (CI). Dysphagia presence was determined using a *GUSS-IVA* cut-off of <10 points or a failed direct swallow test and a DOSS score of ≤5 according to the FEES assessment. Acceptable psychometric properties of a dysphagia screening instrument are recommended to be >70% sensitivity and >60% specificity.[34] Convergence validity was determined using the phi-coefficient (for correlation between two categorical variables) and the Spearman rank correlation, analyzing the correlation between *GUSS-IVA* scores with DOSS, FOIS, and PAS. Inter-rater reliability was evaluated with Cohen's weighted kappa (quadratic weights). All analyses were performed using IBM SPSS Statistics version 29.0.

2.6 | Sample size and power calculation

The sample size and power calculation was calculated using the sensitivity analysis estimation method described by Bujang and Adnan[35]; with an incidence rate of 40%[4] and a power of 0.885, a minimum of 48 patients was required. To account for potential dropouts, 10% was added, resulting in a minimum sample size of 53 patients.

3 | RESULTS

3.1 | Participants

Of 61 eligible patients, 56 (36 men) were included in the study; five were excluded due to incomplete data (see Figures 1 and 2). The characteristics of the participants are shown in Table 1. FEES was performed in 51 of the 56 participants; five underwent screening only, due to fatigue or time constraints ($n = 4$) and nasal blood clotting ($n = 1$). No adverse events occurred during screening or instrumental assessment.

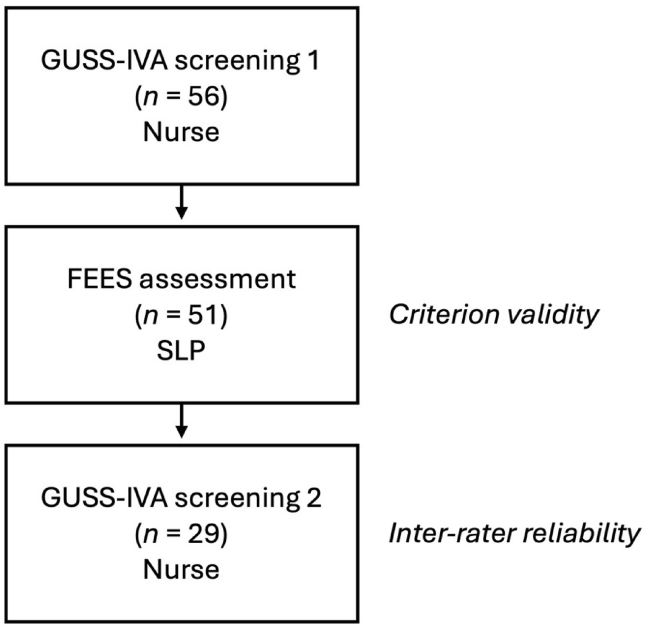

FIGURE 1 Flow chart of the validation procedure. FEES, Flexible Endoscopic Evaluation of Swallowing; *GUSS-IVA*, The Gugging Swallowing Screen—Intensive Care Unit (Swedish); SLP, Speech Language Pathologist.

3.2 | *GUSS-IVA* and FEES assessment

GUSS-IVA screening by ICU nursing staff identified 38 of 56 (67.9%) patients as having dysphagia. The FEES assessment classified 42 of 51 (82.4%) participants as having dysphagia (DOSS score ≤5): 13 (25.5%) severe (DOSS 1), 3 (5.9%) moderately severe (DOSS 2), 7 (13.7%) moderate (DOSS 3), 5 (9.8%) mild–moderate (DOSS 4), and 14 (27.5%) mild (DOSS 5). A total of 16 of 51 (31.4%) participants were classified as aspirating (PAS score >5). In the subgroup of patients with a tracheostomy, the severity of dysphagia was as follows according to FEES assessment: six severe (DOSS 1), two mild–moderate (DOSS 4), and six mild (DOSS 5).

3.3 | Criterion validity

The criterion validity of *GUSS-IVA* for screening for dysphagia is shown in Table 2. For the total cohort, *GUSS-IVA* identified dysphagia (DOSS ≤5) with a sensitivity of 81.0% and a specificity of 88.9% (AUC was 0.85, 95% CI: 0.71–0.95) (Figure 3). As shown in Table 2, eight patients who initially passed the GUSS-IVA were subsequently classified as having dysphagia based on the FEES assessment. The severity

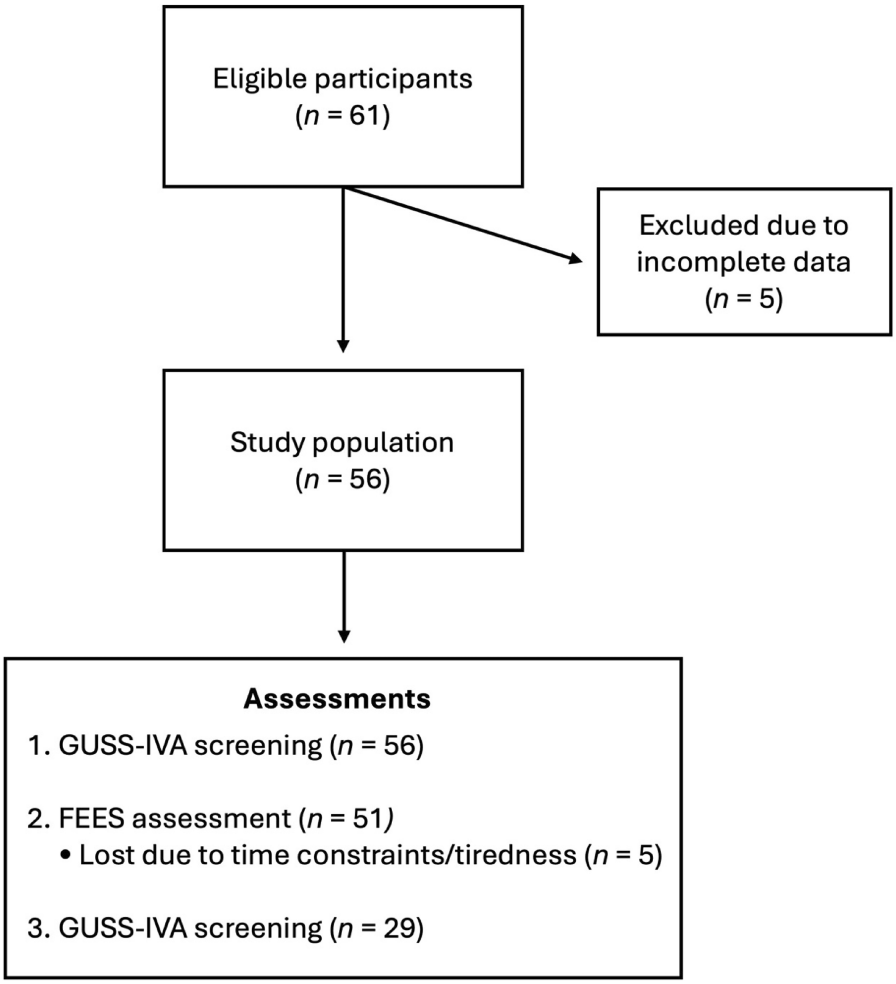

FIGURE 2 Flow-chart of subject inclusion and data collection, all performed within 2 h. FEES, Flexible Endoscopic Evaluation of Swallowing; *GUSS-IVA*, The Gugging SwallowingScreen—Intensive Care Unit (Swedish).

TABLE 1 Characteristics of the participants.

Variables	Baseline ($n = 391$)
Median age [IQR]	67.0 [32.0–84.0]
Sex	
Men	36 (64.3)
Women	20 (35.7)
Reason for ICU admission	
Sepsis/infectious diseases	25 (44.6)
Surgical complications	15 (26.8)
Medical	8 (14.3)
Neurological	4 (7.1)
Trauma	4 (7.1)
Median intubation time, hours [IQR]	123 [48–329]
Tracheostomy	
No	39 (70.0)
Yes	17 (30.0)

Note: Data are given as number of participants, *n* (%) or median [IQR].
Abbreviations: IQR, interquartile range; ICU, intensive care unit.

of dysphagia in these patients was distributed as follows: one severe (DOSS 1), two moderately severe (DOSS 2), one mild–moderate (DOSS 4), and three mild (DOSS 5).

3.4 | Convergent validity

GUSS-IVA showed strong correlation with DOSS ($\phi = 0.57$; $r_s = 0.57$, $p < .001$) and FOIS ($\phi = 0.52$; $r_s = 0.52$, $p < .001$), and moderate correlation with PAS ($\phi = 0.30$; $r_s = 0.30$, $p = .033$) as per the comprehensive FEES assessment.

3.5 | Inter-rater reliability

Twenty-nine participants were assessed twice within 2 h by two ICU nurses using *GUSS-IVA*. The inter-rater reliability between the ICU nurses showed moderate agreement ($\kappa = 0.501$, $p = 0.006$ as computed using Cohen's kappa). In 7/29 (24%) cases, the assessors were not in agreement. In three cases (10%), the first assessor found that the patient had voice changes in part 1, while the second assessor did not. In four cases (14%), the water test differed between assessors in part 2.

4 | DISCUSSION

The results from this study indicate that the Swedish version of GUSS-ICU (*GUSS-IVA*) is a valid and reliable screening instrument

TABLE 2 Sensitivity, specificity, and predictive values in *GUSS-IVA* compared to gold standard FEES assessment evaluated with DOSS ($n = 51$).

	FEES results		
	Dysphagia (DOSS 1–5)	**Normal swallowing (DOSS 6–7)**	
GUSS-IVA results			
Dysphagia	34	1	PPV = 97.1% (0.84–0.99)
Normal swallowing	8	8	NPV = 50.0% (0.34–0.66)
Sensitivity	81.0% (0.66–0.91)	Specificity	88.9% (0.52–0.99)
AUC total	0.85 (0.71–0.99)	Prevalence	82.4% (0.69–0.92)

Note: Results are presented descriptively or as percentages (95% Confidence Interval, CI).
Abbreviations: AUC, area under the curve; DOSS, Dysphagia Outcome Severity Scale; FEES, Flexible Endoscopic Evaluation of Swallowing; GUSS-IVA, The Gugging Swallowing Screen-Intensive Care Unit-Swedish version; NPV, negative predictive value; PAS, Penetration-Aspiration Scale; PPV, positive predictive value.

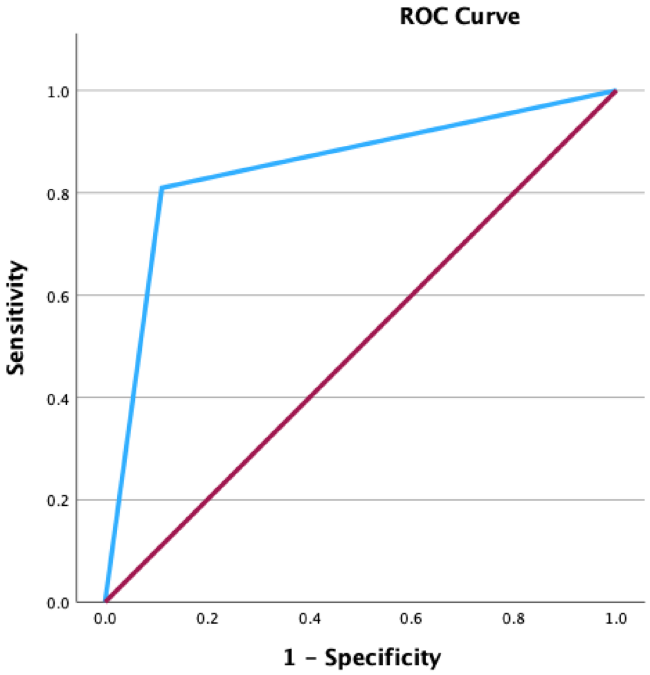

FIGURE 3 Receiver-operator characteristics (ROC) curves for the *GUSS-IVA* as a predictor for dysphagia as diagnosed by Flexible Endoscopic Evaluation of Swallowing (FEES) using the Dysphagia Outcome Severity Scale (DOSS). The area under the curve was 0.85 (CI = 95%, 0.71–0.99).

for dysphagia detection among formerly intubated patients, with sensitivity and specificity values of 81.0% and 88.9%, respectively (AUC = 0.85) and positive predictive values of 97%. The *GUSS-IVA* also exceeds the recommended cut-off values for 'adequate' sensitivity and specificity levels of 70% and 60%, respectively.[34,36]

The strong validity values from the current study, from three mixed ICUs across Sweden with heterogenic patient cohorts, are somewhat congruent with the results of Troll et al.[19] validation study of GUSS-ICU, version 2. In a single-centre study of 45 ICU patients, 80% were diagnosed with dysphagia. Their results also demonstrated high AUC values, although this was for the GUSS-ICU, version 2, using multiple consistencies (thin and thick liquid trials), conducted by two independent SLP assessors, with AUC = 0.923 and 0.923, respectively.[19] Similarly, other researchers have recently published results for a multiple-consistency ICU dysphagia screen, namely the modified volume-viscosity swallow test (VVST).[37] In this single-centre study in Spain, 87 ICU patients (44 extubated and 43 tracheostomized) were screened for dysphagia. Their results identified aspiration in 55% of extubated and 40% of tracheostomized patients.[37] The modified VVST predicted aspiration for extubated patients with a sensitivity and specificity of 89.5% and 72%, respectively. Sensitivity and specificity were also higher for tracheostomized patients, a result that was confirmed in our study. Although these results are somewhat similar to the results of the current study, it should be noted that the Spanish study used the modified VVST to screen for and detect *aspiration*, as opposed to *dysphagia*, which was the primary endpoint in the current study.

Apart from the multiple-consistency dysphagia screens, most have used a single consistency (water) screen,[18,22,38] similar to the current study using *GUSS-IVA*. Johnson et al. investigated the accuracy of the Post-Extubation Dysphagia Screening Tool using a 3-ounce (90 mL) water swallow screen[22] and demonstrated results somewhat congruent to the current study. In their multicentre ICU study of 66 patients, 56% had post-extubation dysphagia, and the sensitivity and specificity of the swallow screen were 81% and 69%, respectively.[22] Although the specificity for the Post-Extubation Dysphagia Screening Tool was lower than the specificity results for the current study, a stark limitation was the lack of a gold standard dysphagia assessment with which to compare the screening tool. Their study design used a clinical swallow examination performed by an SLP to verify the accuracy of the dysphagia screening tool and not a gold standard instrumental assessment, for example, FEES, as in the current study. Finally, other dysphagia screening tools recommended for the ICU population include the Yale Swallow Protocol (3-ounce water test)[38,39] and the Bernese-ICU Dysphagia Algorithm[17,40]; however, these dysphagia screens have not been psychometrically validated in

terms of sensitivity and specificity to detect dysphagia in an ICU population.[6,14,17]

The inter-rater reliability of *GUSS-IVA* demonstrated moderate agreement ($\kappa = 0.501$, $p = .006$), which is a less favourable finding than the results by Troll et al.[19] whose rater agreement for GUSS-ICU with multiple consistencies demonstrated good inter-rater agreement ($\kappa = 0.84$).[19] Possible reasons for the lower reliability results may be due to methodology differences and those performing the dysphagia screen. For example, in the Troll et al. study,[19] SLPs screened all ICU patients, whereas in the current study, ICU nursing staff completed the *GUSS-IVA* screen. This aspect could be particularly important since two of the screening questions evaluate[1] voice quality and[2] swallow safety (in part one and part two of the screen). Given that SLPs are specifically trained to assess voice and swallowing disorders, this could explain the higher agreement in the Troll et al. study.[19] This is particularly pertinent since the voice quality and water test ratings were the only source of disagreement in the current study ($n = 7/29$, 24%). Therefore, based on our findings, information about dysphagia and training for using the *GUSS-IVA* screening tool would be recommended to increase ICU nurses' reliability, as per previous dysphagia screening research.[26,41–43] For optimal implementation of the GUSS-IVA, thorough training of all relevant staff is recommended to ensure that they understand and follow the same procedures and criteria when using the screen. This uniformity in the application helps to achieve high rater reliability and measurement precision, making results more reliable and valid (sensitivity and specificity). Furthermore, given that ICU patients' conditions often fluctuate throughout the day, it is recommended to repeat the GUSS-IVA test every 4 h following a failed attempt until a successful result is achieved, as per previous literature.[18] Additionally, if a patient who initially passed the screening exhibits clinical deterioration, a reassessment should be conducted before initiating oral intake to ensure continued safety and adequate swallow function.

In terms of clinical applicability, our results indicate that *GUSS-IVA* is a valid and reliable tool to detect dysphagia in critically ill patients, with and without tracheostomy, who have been intubated for at least 48 h. It is of clinical importance that an effective and efficient dysphagia screening tool is implemented in the ICU setting to support patient safety and reduce adverse health-related outcomes.[6,8,11,13,15] The validity and reliability of *GUSS-IVA* were tested specifically by ICU nurses (not SLPs with voice and dysphagia expertise) thereby enhancing the clinical applicability of *GUSS-IVA*. ICU nursing staff are essential team members in patient care who follow patient progression and identify when patients are appropriate for dysphagia screening—additionally, nursing staff are best placed to perform the dysphagia screening—all important factors for successful implementation. Furthermore, a dysphagia screen should be quick and easy to perform; therefore, a screen using water instead of liquids or other viscosities is preferred in the ICU, which has limited access to modified food and fluids. Finally, patients who fail the dysphagia screen should be subsequently referred to an SLP for a gold-standard instrumental and diagnostic evaluation followed by appropriate dysphagia therapy and team management.[11,13,15,36]

4.1 | Strengths and limitations

A strength of the current study is the multicentre study design which aimed to decrease the risk of selection bias. Additionally, the heterogeneity of the underlying diagnoses within our included patient cohort is reflective of the Swedish ICU population in general and underscores the applicability of using *GUSS-IVA* in a mixed ICU population. Since the inclusion criteria involved informed consent, there is a risk that this cohort does not represent a typical cohort of patients with dysphagia in the ICU. Moreover, given that many ICU patients experience delirium or agitation in the initial hours following extubation, not being able to give informed consent introduces a potential selection bias by underrepresenting patients suffering from acute confusion or delirium, thereby affecting the observed prevalence data. Results pertaining to the GUSS-IVA validity and reliability data should also be considered since non-alert patients (who could not give consent) would inevitably also fail the first part of the GUSS-IVA screening, which required adequate RASS and CAM-ICU or the Nursing Delirium Screening scores. The patients who failed GUSS-IVA due to inadequate agitation and delirium scores were placed nil by mouth and rescreened after 4 h.

Another limitation is the study sample size ($n = 56$). Although the whole group sample was of adequate power (88.5%), a larger sample size might have generated different psychometric results for validity and reliability and allowed for analyses of subgroups. Although the present validation was conducted on patients who waited 24 h post-extubation, the optimal timing for screening should prioritize early assessment, provided patients are alert, cooperative, and deemed ready by the medical team to screen for oral intake of food, liquids, or medications as recommended by recent research and expert recommendations.[18,43] It is therefore reasonable to propose that the GUSS-IVA could also be effectively applied to patients within the first 24 h post-extubation to align with current recommendations for earlier swallow screening.[18,44,45] Finally, investigating the validity and reliability of *GUSS-IVA* in specific ICU populations, such as cardiothoracic or neurological intensive care units, is also warranted.

5 | CONCLUSION

The study indicates that the Swedish version (*GUSS-IVA*) of the GUSS-ICU is a valid and reliable screening tool to detect dysphagia in critically ill patients, both with and without a tracheostomy. Given the significant short-and long-term negative impacts of dysphagia, this study provides an essential first-step resource to assist in the early identification and optimization of dysphagia management. Dysphagia consequences are modifiable risks and, as such, this study supports previous research in advocating for improved dysphagia management, starting with screening all prolonged-intubated and tracheostomized individuals in the ICU.

AUTHOR CONTRIBUTIONS

Conception and design: PH, AS, TH, LB, and JS; *Collection and assembly of data*: All authors; *Data analysis*: PH; *Interpretation of results and*

manuscript writing: All authors; *Final approval of manuscript*: All authors.

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DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

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SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

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