The interdisciplinary fibreoptic endoscopic evaluation of swallowing assessments in ICU patients: A file review

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Background. Dysphagia is a complex condition common in critical care settings, often resulting from multifactorial causes such as trauma, neuromuscular weakness, impaired cognition, intubation and the presence of a tracheostomy. Dysphagia can have serious consequences, including aspiration pneumonia and prolonged hospital stays, which need to be avoided in resource-constrained environments such as South Africa (SA).
Objective. To investigate the characteristics of dysphagia in critically ill patients using an interdisciplinary assessment approach that utilises both bedside evaluations and fibreoptic endoscopic evaluation of swallowing (FEES).
Methods. A retrospective file review was conducted of 68 adult patients who underwent interdisciplinary dysphagia assessments in a private SA hospital between July 2022 and January 2024. Data collected included clinical notes, anatomical and physiological markers, Penetration-Aspiration Scale (PAS) scores and post-assessment diagnoses. Descriptive statistics were employed to analyse variables such as age, gender, comorbidities and dysphagia symptoms.
Results. The mean age of participants was 59.5 years (standard deviation (SD) 17.05 years), with the majority presenting with trauma-related injuries or cerebrovascular accidents. Dysphagia was prevalent, with 49% of patients exhibiting significant swallowing difficulties. The mean PAS score was 3.44 (SD 2.82), indicating that material often entered the airway without being ejected. Notably, 17% of patients presented with silent aspiration, highlighting the need for comprehensive interdisciplinary assessment techniques. Common symptoms included pooling, dysphonia and delayed swallow triggers, which may be identified at the bedside and confirmed using FEES. Patients were referred to speech-language therapy (SLT) after a median of 13 days in the intensive care unit (ICU).
Conclusion. Dysphagia is a significant concern in critical care, necessitating early and co-ordinated assessment strategies to minimise complications and improve patient outcomes. This study advocates enhanced protocols and interdisciplinary collaboration to manage dysphagia effectively. Early referral to SLT is critical for timely intervention, which is essential in an under-resourced setting. Future research across various settings is needed to further validate the interdisciplinary model of dysphagia assessment and management and to generate additional local data on dysphagia in the ICU.
Keywords: dysphagia, ICU, interdisciplinary, speech-language therapy, speech-language pathologist, ear, nose and throat

South Afr J Crit Care 2026:42(1):e3328. https://doi.org/10.7196/SAJCC.2026.v42i1.3328

Contribution of study
This retrospective file review demonstrates the prevalence, clinical features, and consequences of dysphagia among critically ill adults assessed with an interdisciplinary FEES approach in a South African (SA) ICU. The study contributes to important local evidence by (*i*) quantifying the burden of dysphagia and silent aspiration in an ICU population, (*ii*) showing that interdisciplinary FEES (SLP + ENT) augments the standard bedside dysphagia assessment and yields important diagnostic detail that informs safer feeding and management decisions, and (*iii*) identified substantial delays to SLT for assessment that likely increase the risk of complications such as aspiration pneumonia. These findings support calls for earlier SLT involvement, development of context-appropriate referral pathways and practice guidelines, and wider adoption of interdisciplinary assessment models in resource-constrained SA ICU settings

Swallowing is a complex, highly co-ordinated process that involves both cortical and subcortical brain structures, five cranial nerves and 26 muscles. It works in synchrony with respiration to prevent aspiration.[1] Dysphagia – defined as difficulty swallowing – disrupts this intricate process. It has diverse causes and may lead to serious medical consequences.[2] Dysphagia is particularly common among patients in critical care settings and often arises from various contributing factors. Critical care-related swallowing difficulties may result from direct trauma, neuromyopathy associated with ICU-acquired weakness, reduced oropharyngeal and laryngeal sensation, impaired cognition, altered levels of consciousness, gastro-oesophageal reflux and disrupted co-ordination of breathing and swallowing. This multifactorial nature further emphasises the complexity of dysphagia and the importance of understanding its causes to mitigate the impact on patient outcomes.[3-8]

Furthermore, in critical care settings, patients often require mechanical ventilation or tracheostomies, both of which involve placing tubes in the airway. These interventions may disrupt normal swallowing mechanisms by impairing safe swallowing and preventing adequate

vocal cord closure. As a result, patients may experience difficulties with both voicing and airway protection.[9] According to research data from the Global North, post-extubation dysphagia (PED) occurs in approximately 49% of patients. PED is primarily caused by laryngeal trauma from endotracheal intubation.[10] In addition, the presenting diagnosis may also result in dysphagia.

Complications of dysphagia include aspiration, aspiration pneumonia, decreased quality of life, malnutrition and death.[9] These complications may prolong the stay in critical care. In a setting such as South Africa (SA), with significant resource scarcity and a high patient load, prolonged hospital stays should be avoided. Given the heterogeneity of dysphagia, assessment and management should adopt an interdisciplinary team approach; however, this seldom happens.

Dysphagia assessments are typically performed at the bedside by a speech-language pathologist (SLP), a team member specialising in dysphagia.[11] A limitation of bedside assessment is the lack of visualisation of the pharynx and larynx, which may reduce sensitivity for detecting potential bolus pooling and increase the risk of missing silent aspiration.[12] In more economically developed regions, the use of instrumental measures is recommended. However, owing to resource scarcity in SA, instrumental assessments such as fibreoptic endoscopic evaluation of swallowing (FEES) are conducted only when necessary. FEES enables visualisation of the hypopharynx, larynx and airway.[13] According to Langmore *et al.*,[13] it also allows assessment of swallowing using real food and various consistencies. Although insertion of the endoscope is typically performed by an ear, nose and throat (ENT) specialist, the SLP interprets the swallowing results. These two examiners from different disciplines may also trial various intervention techniques to determine the best approach for the patient.[13] This assessment is scored either informally or using a standardised tool, such as that developed by Langmore *et al.*[13] or the Visual Analysis of Swallowing Efficiency and Safety tool from Curits *et al.*[14] This study applied an informal recording approach, which involved a file review and was scored using the Penetration-Aspiration Scale (PAS), which ranges from 1 to 8 (Supplementary Table 1).

One of the main arguments proposed by the researchers is that, given the heterogeneity of dysphagia and resource limitations, an interdisciplinary assessment approach may be more suitable than the traditional multidisciplinary model.[13] This argument aligns with findings from other settings and reflects common practice in under-resourced contexts, where bedside assessments are often conducted solely by SLPs due to limited access to instrumental evaluation.

Conducting a FEES assessment with both an ENT and an SLP may yield more clinical data to inform decisions regarding feeding and dysphagia management. This shift could lead to a more holistic and efficient model of dysphagia assessment and management.

Objective

This quantitative, non-experimental descriptive study aimed to describe the signs and symptoms of dysphagia in adult patients who underwent an interdisciplinary dysphagia assessment in a critical care unit at a private hospital facility in SA.

Methods

Sample

A total of 68 SLT patient files met the inclusion criteria, namely having undergone an interdisciplinary FEES swallowing assessment at the unit between July 2022 and January 2024.

Ethical approval

Ethical approval for the study was granted by the Human Research Ethics Committee (Medical) of the University of Witwatersrand (ref. no. M240257), as well as from the SLP practice at the study site.

Study design

A retrospective file review design and purposive convenience sample approach was used.[15] Data were captured from the SLT patient files by a research assistant and then verified by the study author to ensure reliability. A double-checking process was implemented whereby a subset of data entries was randomly selected and verified for accuracy. Any discrepancies were reviewed and resolved through consensus within the research team. All data were anonymised, and no identifiable information was recorded. Each patient file was assigned a unique code, and relevant data were entered into an Excel (Microsoft, USA) spreadsheet stored securely on a password-protected computer. Access to the data was restricted to the research team for a duration of five years.

To enhance the validity of the study, predefined data extraction criteria were established based on previous research and the study objectives to ensure consistent and accurate data collection. Extracted information included demographic details (age, gender and co-existing conditions), clinical data (length of stay, length of time to referral for SLT, dysphagia signs and symptoms, dysphagia severity measures, interventions received and clinical outcomes) and the presence of a tracheostomy, percutaneous endoscopic gastrostomy (PEG), nasogastric feeding tube (NGT) or total parental nutrition (TPN).

Data analysis

Given the nature of the data, only descriptive statistical analyses were performed using IBM SPSS Statistics, version 28 (IBM Corp., USA). The descriptive statistics used in this analysis included the mean and median (central tendency), standard deviation (SD) (data dispersion), minimum and maximum values (range) and skewness and kurtosis (distribution asymmetry and peakedness, respectively).[16]

Results

The results highlighted patterns in patient characteristics, assessment timelines and the nature of dysphagia observed. For length of ICU stay and time to SLT referral, the data were skewed by outliers; therefore, median, minimum and maximum values were interpreted in preference to the mean and SD.[16]

Sample demographics

Table 1 summarises the gender profiles and diagnoses of the sample, while Table 2 outlines prominent diagnoses observed. Consistent with SA statistics,[17] most ICU patients were men, and trauma was the leading reason for admission, followed by cerebrovascular accidents (CVAs). At the time of SLT referral, not all patients required oxygen support, but 42% had a tracheostomy in situ. Notably, 16% of the sample had a PEG in situ prior to SLT referral. Table 2 provides insight regarding which ICU population is at a greater risk of developing dysphagia, which may guide practitioners in determining referral timing for SLT assessment.

Referral times to SLT by ICU team members

Table 3 presents descriptive statistics for patient age and length of ICU stay. Time to SLT referral in the ICU ranged from 1 to 139 days, with a median of 13 days. Time to FEES assessment for an official diagnosis of dysphagia ranged from 1 to 82 days, with a median of 19.5 days and a

Table 1. Descriptive statistics for gender, diagnostic category, tracheostomy status, NGT status, PEG status and TPN status (*n*=68)

Variable	Category	*N* (%)	Variable	Category	*N* (%)
Gender	Male	40 (58.8)	Trach.	None	24 (35.3)
	Female	28 (41.2)		Yes	42 (61.8)
Diagnostic category	Trauma	31 (45.6)		Nasal cannula	1 (1.5)
	CVA	18 (26.5)		Post-extubation	1 (1.5)
	Complex	9 (13.2)	NGT	No	32 (47.1)
	Cancer	3 (4.4)		Yes	20 (29.4)
	Neurological	3 (4.4)		Removed	16 (23.5)
	Functional dysphagia	2 (2.9)	PEG	No	51 (75.0)
	Other	2 (2.9)		Yes	16 (23.5)
-	-	-		Removed	1 (1.5)
	-	-	TPN	No	63 (92.6)
	-	-		Yes	5 (7.4)

CVA = cerebrovascular accident; Trach. = tracheostomy; NGT = nasogastric tube; PEG = percutaneous endoscopic gastrostomy; TPN = total parenteral nutrition; Complex = A medically complex patient presenting with multiple co-existing conditions such as cardiac, renal, respiratory and/or neurological disorders and that requires ongoing co-ordinated care across various specialties.

Table 2.

Variable	Category	*N* (%)	Variable	Category	*N* (%)
Trauma	MVA/ polytrauma	20 (29.4)	Complex	Heart failure	4 (5.9)
-	Traumatic brain injury	9 (13.2)	-	Renal failure/ CKD	2 (2.9)
-	Burns	3 (4.4)	-	Organ failure	2 (2.9)
-	Gunshot wounds	4 (5.9)	-	Respiratory failure	1 (1.5)
-	Spinal cord injury	3 (4.4)	-	COPD/COAD	2 (2.9)
-	Fractured bones	2 (2.9)	-	Pneumonia	3 (3.4)
-	Internal bleeding	1 (1.5)	-	Asthma	1 (1.5)
-	Hypoxic brain injury	1 (1.5)	-	Prolonged ventilation	1 (1.5)
-	Haematoma	1 (1.5)	-	Pulmonary embolism	1 (1.5)
CVA	CVA	15 (22.1)	-	Post-surgery complications	1 (1.5)
-	AV malformation	1 (1.5)	-	Hypernatraemia	1 (1.5)
-	Hypertension	2 (2.9)	-	Sepsis	2 (2.9)
-	Myocardial infarction	1 (1.5)	-	Urosepsis	1 (1.5)
-	Rapid atrial fibrillation	1 (1.5)	-	Fungal sepsis	1 (1.5)
Cancer	Cancer	3 (4.4)	Other	Aspiration	1 (1.5)
Functional dysphagia	Functional dysphagia	2 (2.9)	-	Hiatus hernia oesophageal dilation	1 (1.5)
Neurological	Dementia	2 (2.9)	-	Achalasia	1 (1.5)
-	Myasthenia gravis	2 (2.9)	-	Vocal cord palsy	1 (1.5)
-	Parkinson's disease	1 (1.5)	-	GERD	2 (2.9)

MVA = motor vehicle accident; CVA = ccerebroral vascular accident; AV = arteriovenous; CKD = chronic kidney disease; COPD = chronic obstructive pulmonary disease; COAD = chronic obstructive airway disease; GERD = gastro-oesophageal reflux disease.;

Table 3. Descriptive statistics for age, time spent in ICU, time to referral to the speech-language pathologist and time to the FEES (*n*=68)

Variable	Mean	Median	SD	Min.	Max.	Skewness	Kurtosis
Age	59.5	61.00	17.053	25	88	-0.241	-1.027
Time spent in ICU (days)	45.25	31.50	40.003	2	172	1.610	2.322
Time to referral (days)	19.19	13.00	20.685	1	139	3.192	15.998
Time to FEES (days)	24.69	19.50	20.030	0	82	0.846	0.079

FEES = fibreoptic endoscopic evaluation of swallowing; SD = standard deviation; Min. = minimum score; Max. = maximum score; ICU = intensive care unit.

mean of 24.69 (SD 20.03) days. Time spent in the ICU ranged from 2 to 172 days, with a median of 31.5 days.

Interdisciplinary dysphagia assessment results

FEES results

The FEES results (Tables 4 and 5) – conducted as interdisciplinary assessments by the SLP and the ENT – were scored using the PAS score, which ranges from 1 to 8, with higher scores indicating more severe dysphagia (STable 1). The mean PAS score was 3.44 (SD 2.82), indicating that bolus material entered the airway above the level of the vocal cords without being ejected from the airway. Twenty-seven patients (39.7%) had a PAS score of 1, while 12 patients (17.6%) had a PAS score of 8.

Specific signs and symptoms identified during the FEES assessments included pooling in the laryngeal vestibule (51.5%), secretions (20.6%),

vocal cord palsies (19.1%) and delayed swallow triggers (19.1%). Coughing, a common sign of laryngeal penetration, was noted in only 4 patients.

Bedside assessment results

Symptoms of dysphagia were also noted during bedside assessment, of which the most notable was coughing after swallowing (38%). In the bedside assessment conducted by the SLP alone, coughing was more commonly associated with impairment of the pharyngeal phase of swallowing. However, the underlying anatomical or physiological mechanism, and whether coughing reflected laryngeal penetration and airway protection or actual aspiration remains unknown, as this was not documented in the files.

Complications from dysphagia observed in the sample

Table 6 summarises the complications observed in the sample. Notably, 13 patients (19.1%) already presented with aspiration pneumonia at the time of SLT referral.

SLT intervention strategies used

All patients received SLT intervention, consisting of either direct or indirect swallowing therapy, depending on clinical presentation and medical stability. Direct therapy involved exercises and strategies incorporating the swallowing of food or liquid. Indirect therapy focused on activities to improve swallowing function without introducing food or liquid, such as oral motor exercises, sensory stimulation, vocal cord medialisation or respiratory support techniques.

Most patients required some degree of diet modification during their hospital stay. This finding suggests that a staggered approach for safely introducing oral feeds is necessary in this population, supporting the importance of SLP involvement.

Discussion

Dysphagia is commonly encountered in the ICU, and patients often present with subsequent complications. Delayed referral to SLT may contribute to these adverse outcomes. Following an interdisciplinary dysphagia assessment, the SLP is able to make an informed dysphagia diagnosis and implement a customised treatment plan. In this study, FEES findings were consistent with bedside assessment results but provided additional diagnostic detail, supporting the need for an interdisciplinary approach in managing this heterogeneous condition.

The study sample aligned with SA's quadruple burden-of-disease profile, in which trauma and CVAs are prevalent across both private and public healthcare sectors.[17] Similarly, our findings reflected that most ICU patients had trauma-related injuries, followed by CVAs, and that the majority were men. These findings may assist practitioners in identifying who is most at risk of developing dysphagia in the ICU and who should be referred early for assessment by the SLP.

Currently, there appears to be a lack of dysphagia practice guidelines across all SA ICUs. Although the present findings may help provide a platform for the development of such guidelines, further exploration is required by both researchers and clinicians. Future guidelines should be contextually relevant and consider both patient demographics and the contextual challenges within the healthcare setting. In particular, the importance of early screening and subsequent referral for dysphagia assessment and intervention should be emphasised in these guidelines.

A high number of patients also presented with a tracheostomy in situ, underscoring the importance of SLPs in the assessment and management of these patients, given the implications for dysphagia outcomes.[5] Although a detailed analysis of tracheostomy-related dysphagia falls outside the scope of this article, it warrants mention considering its prominence in the dataset.

The results also highlight the referral practices of the medical teams in the ICU by examining engagement with SLT services. Given the prevalence of dysphagia in SA ICUs, the delayed SLT referrals (median 13 days, maximum 139 days) and delay in FEES assessments (mean 25 days) are concerning. International literature recommends referral to SLT within the first 24 hours of ICU admission.[18] The delays observed in this study suggest a need to revise referral practices within the SA context. Early referral to SLT may assist with timely identification of

Table 4. PAS score for FEES (n=66)

Variable	Mean	Median	SD	Min.	Max.	Skewness	Kurtosis
PAS score for FEES	3.4	2.0	2.8	1	8	0.7	-1.2

PAS = penetration-aspiration scale; FEES = fibreoptic endoscopic evaluation of swallowing; SD = standard deviation; Min. = minimum score; Max. = maximum score.

Table 5. Descriptive statistics for PAS scores (n=66)

Variable	Category	*N* (%)	Variable	Category	*N* (%)
PAS score	Score 1	27 (39.7)	PAS score	Score 5	3 (4.4)
	Score 2	10 (14.7)		Score 6	0
	Score 3	5 (7.4)		Score 7	6 (8.8)
	Score 4	3 (4.4)		Score 8	12 (17.6)

PAS = penetration-aspiration scale.

Table 6. Descriptive statistics for complications and outcome (n=68)

Variable	Category	*N* (%)	Variable	Category	*N* (%)
Complications	None	50 (73.5)	Outcome	Discharged	52 (76.5)
-	Sepsis	3 (4.4)	-	Died	14 (20.6)
-	Aspiration pneumonia	13 (19.1)	-	Still in hospital	1 (1.5)
-	Aspiration pneumonia and fungal sepsis	1 (1.5)	-	Palliative care	1 (1.5)
-	Micro-aspirations	1 (1.5)	-	-	-

dysphagia, prevent related complications and potentially reduce both ICU and overall hospital length of stay – an important consideration given the high demand for ICU beds in SA.[17] This is pertinent, as the data from this study show that certain patients already presented with complications from dysphagia prior to SLT referral. Furthermore, 16% of the sample had a PEG tube in situ prior to referral, raising questions regarding feeding decisions and the timing of enteral feeding in critical care. This is particularly relevant given the median ICU stay of 31.5 days in this sample.

Reducing complications may reduce hospital stays,[11] optimise the use of much-needed resources and improve patients' quality of life. Addressing these issues requires input from an interdisciplinary team.[19] Team discussions in different units may help identify why referrals are delayed and how this can be addressed in each setting. These discussions should occur in both private and public contexts, taking into account the different contextual factors involved. This represents a potential area for future research by both SLPs and other healthcare workers in the ICU setting.

The importance of early identification and assessment is further highlighted by the PAS findings, with 17% of patients scoring 8, indicating silent aspiration. This is the most severe form of dysphagia and does not present with obvious clinical signs at the bedside, increasing the risk of delayed recognition and referral. This underscores the need for early assessment and intervention in patients at risk of dysphagia.

Bedside assessments conducted by SLPs indicate that dysphagia is prevalent in the ICU population in SA. The most commonly observed signs included coughing, poor secretion management, dysphonia and delayed swallow triggers. These are recognised indicators of dysphagia[20] and may indicate an increased risk of aspiration and subsequent aspiration pneumonia. Follow-up FEES assessments conducted by the ENT and SLP augmented the bedside assessment results, suggesting that the initial bedside assessment findings are reliable and that a dysphagia intervention plan can be implemented following the initial bedside assessment – knowledge that may affect recommendations regarding feeding and swallowing exercises. However, information on whether a patient is actually aspirating or whether it is only laryngeal penetration with airway protection can only be ascertained through an instrumental assessment such as FEES. Although the use of an initial bedside assessment remains valuable, FEES provides greater visual anatomical and physiological swallowing detail, informing decisions regarding feeding recommendations and appropriate swallowing interventions. This has positive implications for SLPs who need to make decisions at the bedside and do not always have ready access to FEES. An interdisciplinary FEES assessment can confirm aspects of swallowing and dysphagia that cannot be visualised during a bedside assessment. This provides further clinical data supporting individualised treatment planning, including the site of pooling, vocal cord paralysis and the presence of silent aspiration, which was seen in 17% of the sample size. The findings also indicate that patients are prone to bolus pooling in the laryngeal vestibule, which may lead to post-swallow aspiration, highlighting the variable clinical bedside presentation of dysphagia.

These findings support the development of guidelines that identify patients at risk of dysphagia and prioritise early assessment in the ICU, especially in resource-constrained SA settings. Such guidelines would require an interdisciplinary team approach.

Results from both bedside and FEES evaluations may improve the development of patient-centred therapy plans and support clinical decision-making regarding the safest food and liquid consistencies for each patient. More importantly, patients with silent aspiration may otherwise remain undetected until complications such as aspiration pneumonia develop. In this cohort, some patients had already developed aspiration pneumonia prior to SLT referral and assessment. This underscores the importance of an interdisciplinary approach to dysphagia assessments and joint decision-making regarding management.[3] This collaborative approach is further supported in the literature, including studies such as by McRae *et al.*[19]

There remains limited evidence regarding decision-making processes for dysphagia management in the ICU setting in SA, indicating an area for future research.

Study limitations

A key limitation of this study is in its retrospective design, which relies on file reviews. Although retrospective record reviews can be a valuable and cost-effective method for exploring clinical trends, they depend heavily on the completeness and consistency of documentation, which may introduce bias or limit the depth of analysis.[21] Incomplete, missing or inconsistently recorded information may compromise the reliability of findings and potentially lead to the misinterpretation of clinical data.

In addition, the study was conducted in a single private ICU setting, which may limit the generalisability of findings to other contexts, such as the public sector or rural healthcare environments. Generalisability depends on how representative the sample is of the broader population, and limitations in setting and participant diversity may reduce the extent to which findings can inform wider clinical practice.[22] These methodological constraints highlight the need for future prospective studies across diverse clinical settings, using standardised data collection protocols to strengthen data integrity and external validity.

Conclusion

The findings of this study underscore the heterogenous nature of dysphagia among critically ill patients in the ICU. The demographic data aligned with national trends, revealing a predominance of male patients and trauma as the leading cause of ICU admission.

Referral patterns revealed a substantial delay between ICU admission and SLP involvement, which may contribute to the late identification of silent aspiration. Clinical signs observed during FEES, including pooling, thick secretions and vocal cord palsy, were more frequently identified than overt signs such as coughing, highlighting the limitations of relying solely on bedside assessments and underscoring the need for an interdisciplinary approach. Nevertheless, bedside evaluations remain valuable as a preliminary screening tool for signs of potential dysphagia.

More than half of the cohort required diet modification, emphasising the pivotal role of SLP-led dysphagia management in improving outcomes. The results advocate for earlier identification and referral of at-risk patients to SLT services, greater reliance on instrumental assessments such as FEES and increased interdisciplinary collaboration to optimise care for ICU patients with or at risk of dysphagia.

Declaration. None.

Acknowledgements. The authors would like to acknowledge the research assistant Nolitha Radebe for her assistance with data capturing.

Author contributions. Conceived the study: KC. Wrote the article: KC and NB. Data collection: NB. Data analysis: NI.

Funding. None.

Conflicts of interest. None.

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Received 28 March 2025; accepted 1 December 2025.