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The Relationship between Severity of Dysphagia and Aspiration Risk among Patients with Neurogenic Dysphagia

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Abstract: Background: Neurogenic dysphagia is a common problem among critically ill patients. **Purpose of the study**: to examine the relationship between the severity of dysphagia and aspiration risk among patients with neurogenic dysphagia. **Setting**: Medical and Trauma ICUs at Menoufia University Hospital. **Sample**: A convenient sample of 60 patients with neurogenic dysphagia. **Design**: A descriptive study was conducted. **Instruments**: (1) Demographic and Clinical Data Sheet, (2) Dysphagia Severity Rating Scale (DSRS), (3) Mann Assessment of Swallowing Ability (MASA), (4) Functional Oral Intake Scale (FOIS), and (5) Glasgow Coma Scale (GCS. **Results**: There is a highly statistically significant negative correlation between aspiration risk scores and dysphagia severity scores in the studied group ($r = -0.655$, $p = 0.000$). Additionally, there is a highly statisticaly significant negative correlation between the dysphagia severity scores and functional oral intake ($r = -0.597$, $p = 0.000$). **Conclusion**: The severity of dysphagia affects the aspiration risk, and functional oral intake in patients with neurogenic dysphagia. **Recommendation**: Dysphagia screening should become a routine nursing intervention in ICUs to enable early identification of swallowing problems and reduce the fatal outcomes associated with neurogenic dysphagia.

Keywords*: Aspiration risk, Functional oral intake, Neurogenic Dysphagia, and Severity of Dysphagia.*

Introduction

Neurogenic dysphagia is a common complication among ICU patients, resulting from disruptions in the neural system that controls swallowing. This condition can lead to severe consequences, including dehydration, malnutrition, and pneumonia which significantly increase morbidity and

mortality (Cheng et al., 2022). The severity of swallowing difficulties varies from mild discomfort during eating or drinking to a complete loss of pharyngeal response and airway protection, posing serious health risks (Kim et al., 2020).

Globally the incidence of neurogenic dysphagia is estimated to range between 400,000 and 800,000 patients annually, with a prevalence of 8.4% to 16% in the general population (Mittal et al., 2023). Among patients with neurological diseases, dysphagia affects 30% to 82% of patients, with neurological disorders accounting for 70% to 80% of its causes. Additionally, approximately 47% of ICU patients experience dysphagia, highlighting its critical impact in intensive care setting (Suárez-Escudero et al., 2022).

Evidence-based studies indicate that more than 50% of stroke patients experience dysphagia during the acute phase of the condition. The presence of aspiration signs within the first 72 hours post-stroke can predict dysphagia persistence for up to three months, compromising both the effectiveness and safety of swallowing and often leading to complications (Balcerak et al., 2022). Dysphagia is also common and severe in patients with Traumatic Brain Injury (TBI), affecting between 25% to 93% of patients (Roberts & Greenwood, 2019). Additionally, swallowing difficulties have been observed in up to 90% of patients with Multiple Sclerosis (Ansari et al., 2020). Furthermore, approximately 80% of patients with Parkinson's disease experience dysphagia, particularly in the esophageal stage, due to upper esophageal sphincter (UES) dysfunction and impaired esophageal peristalsis (Lee et al., 2023).

Neurogenic dysphagia can have long-lasting and severe effects, often persisting in most ICU patients until discharge. Complications include delays in resuming oral intake, which can lead to malnutrition and dehydration, an increased risk of aspiration and aspiration-induced pneumonia, prolonged ICU and hospital stays, higher morbidity rates, and a 9.2% increase in 90-day mortality, and a one-year mortality rate of up to 25% (Zuercher et al., 2022; Hongo et al., 2022).

Inadequate oral intake is commonly associated with neurogenic dysphagia due to weakness and functional impairments in the tongue, pharynx, lips, cheeks, and masticatory muscles, which affect functional swallowing (Moon et al., 2019). Furthermore, neurological impairments causing dysphagia can negatively impact other aspects of nutrition, including the ability to self-feed (Dobak & Kelly, 2021).Neurogenic dysphagia increases the risk of malnutrition and dehydration due to insufficient oral intake and is often associated with significant distress during meals, as well as aspiration and aspiration pneumonia (Remijn et al., 2022).

Pulmonary aspiration is the most clinically significant complication of neurogenic dysphagia, often presenting acutely with symptoms such as choking, coughing, respiratory distress, wheezing, gasping, gurgling, and tachycardia. However, chronic symptoms such as weight loss,

excessive production of oral secretions, and aspiration pneumonia may also occur (Raciti et al., 2022).

Patients with neurogenic dysphagia experience incomplete laryngeal protection due to reduced and limited epiglottic movement as the bolus enters the pharynx, which is compounded by vocal fold paralysis, leading to impaired upper airway protection during swallowing. Additionally, decreased laryngeal elevation and decreased anterior movement of the hyoid bone cause abnormal hypolaryngeal movements, increasing the risk of aspiration or penetration in dysphagia patients (Banda et al., 2023).

Significance of the Study

Aspiration pneumonia associated with neurogenic dysphagia is a prevalent condition among ICU patients, leading to numerous complications, ranging from the discontinuation of oral intake to an increased risk of mortality (Kato et al., 2025). It is also a common cause of hospital readmission and a leading factor in ICU patient mortality (Carda et al., 2020).

The hallmark of neurogenic dysphagia is reduced oropharyngeal sensitivity, which results in uncontrolled leakage of the bolus from the oral cavity into the pharynx, along with a delayed activation of the swallowing reflex. This condition significantly increases the risk of bolus penetration into the larynx and aspiration into the trachea, often occurring without adequate protective reflexes (Braun et al., 2021). Therefore, reducing aspiration risk in patients with ND is crucial for improving overall health outcomes and preventing associated complications.

Information generated from the current study will provide critical care nurses with insight to intervene more efficiently, thereby preventing associated complications, potentially reducing hospital stays, optimizing the use of limited healthcare resources and enhancing patient care. Thus, the purpose of this study was to examine the relationship between the severity of dysphagia and aspiration risk among patients with neurogenic dysphagia.

Purpose of the Study

The purpose of this study was to examine the relationship between the severity of dysphagia and aspiration risk among patients with neurogenic dysphagia.

Research Questions

1) Is there a relationship between the dysphagia severity and aspiration risk?
2) Is there a relationship between severity of dysphagia and functional oral intake?

Methods

Research Design:

A descriptive design was used.

Setting:

The current study was conducted in the the Medical and Trauma Intensive Care Units at Menoufia University hospital, Menoufia Governorate, Egypt.

Sample:

A convenient sample of 60 patients with neurogenic were screened daily for possible enrollment in the study.
Patients who met the study inclusion criteria included:a) adults aged 18 to 65 years, b) diagnosed with neurogenic dysphagia (scoring 4 or higher on the Dysphagia Severity Rating Scale [DSRS], c) a score of 13 or higher on the Glasgow Coma Scale (GCS) and d) a score of 169 or lower on the Mann Assessment of Swallowing Ability (MASA). Patients were excluded if they had: a) degenerative diseases such as Parkinson's disease or Alzheimer's disease, as these are considered progressive neurological conditions, b) patients with esophageal dysphagia due to mechanical or obstructive esophageal disorders (such as esophageal tumors or strictures), as dysphagia in these cases is primarily caused by tissue fibrosis, which impairs lymphatic circulation, causes tissue edema, and reduces the stiffness and elasticity of muscles involved in swallowing.

Sample Size Calculation:

A power analysis was conducted using G power software to estimate the required sample size and ensure adequate statistical power for data analysis. With a power of 0.80, an alpha of 0.05, and an effect size of 0.50, Medium effect size was chosen in the current study because it was anticipated to examine the relationship between the severity of dysphagia and aspiration risk among patients with neurogenic dysphagia (Braun et al., 2021). Based on this calculation, a sample size of 60 patients with neurogenic dysphagia were needed for the sample.

Instruments of Data Collection:

Instrument one: A Demographic and Clinical data Sheet:

The researcher collected data about patient's age, gender, and medical diagnosis, cause of neurogenic dysphagia and ICU length of stay. This information was extracted from the patient's medical records at the initial data collection point after ICU admission.

Instrument two: The Dysphagia Severity Rating Scale (DSRS):

Developed by O'Neil et al. (1999),the DSRS is a 7-point Likert scale assessing severity of dysphagia based on fluid and diet modifications, and supervision requirements for safe oral intake. Scores range from 0(normal) to 12 (sever dysphagia), with scores ≥4 indicating unsafe swallowing. The DSRS has been validated with good test-retest reliability (0.82–0.90) and was confirmed in this study with an internal consistency r=0.79 reliability (Cronbach's Alpha = 0.77).

Instrument three: Mann Assessment of Swallowing Ability (MASA):

Developed by Carnaby-Mann (2002), MASA is a bedside assessments tool for aspiration risk in neurological patients. It consists of 24 items scored on a 10-point scale, with total scores ranging from 38 to 200. Higher scores indicate a lower aspiration risk, with cut-off points categorizing aspiration severity,no aspiration (170–200), mild

(149–169), moderate (141–148), and severe (≤140) (Carnaby-Mann, 2002). MASA has a sensitivity of 73%, specificity of 89% (Carnaby-Mann, 2007). In this study, its validity was confirmed (r=0.82), and reliability was supported (Cronbach's Alpha = 0.70).

Instrument four: Functional Oral Intake Scale (FOIS):

Developed by Crary et al. (2005), the FOIS measures functional oral intake level on scale from 1 to 7. Scores 1 - 3 indicate non-oral feeding, while scores 4 - 7 indicate varying level of oral intake. FOIS valid is well established (81% to 98%) with inter-examiner reliability between 0.86 and 0.91 (Crary et al., 2005). In this study, its validity (r=0.69) and reliability (Cronbach's Alpha = 0.78) were confirming.

Instrument five: Glasgow Coma Scale (GCS):

Developed by Teasdale and Jennett (1974), the GCS assesses consciousness level through motor, verbal, and eye-opening responses. Scores range from 3(sever brain injury) to 15(fully conscious).

The scale's inter-rater reliability is 0.86, with subscale reliability score for eye (0.76), verbal (0.67), and motor responses (0.81) (Gill, Reiley & Green, 2004). In this study, its validity (r=0.74) and reliability (Cronbach's Alpha = 0.75) were confirmed.

Instrument six: Simplified Acute Physiology Score (SAPS) II:

Developed by Le Gall et al. (1993), the SAPSII assesses the severity of illness in patients admitted to ICU through a score ranging from 0 to 160 based on 12 physiological factors, age-related variable, the type of admission and 3 variables related to underlying diseases.

The reliability of SAPS II, where the internal consistency, evaluated using the intraclass correlation coefficient (95% CI), was 0.84 for the total scale (Strand et al., 2010). In this study, its validity (r=0.65) and reliability (α = 0.79) were confirmed.

Ethical Consideration

Approval for the study was obtained from the Research Ethics Committee at the Faculty of Nursing (Approval No. 836) and the University Hospital Director after explaining the purpose of the study. Written informed consent was obtained from all eligible participants. During the initial interview, patients were informed about the study objectives, and potential benefits. They were assured that participation was voluntary and that they could withdraw at any time. Confidentiality and anonymity were maintained by coding data and securely storing all records.

Pilot study

A pilot study was conducted with 10% of the sample (6 patients) to assess the feasibility and applicability of the study instruments. Patients who participated in the pilot study were excluded from the final analysis.

Data Collection Procedure

Patients with neurogenic dysphagia were enrolled in the study from the beginning of February 2023 to the end

of June 2024. Participants who met the inclusion criteria, as determined by the Dysphagia Severity Rating Scale (DSRS) for dysphagia diagnosis and the Glasgow Coma Scale (GCS) for assessing consciousness level were recruited. Each patient was individually interviewed by the researcher in the ICU before the interventions began. All groups were matched as closely as possible to the study's inclusion criteria, particularly in terms of age and sex.

Potential participants were approached by the researcher and asked them if they are willing to participate in the study. If they volunteered to participate, they were handled the study instruments. The researcher visited the designated units during the different work shifts. Visits were scheduled for four consecutive weeks throughout the different shifts. Participated patients completed the study instruments at their convenience during the shift.

Data Analysis

Data was coded and transformed into specially designed form to be suitable for computer entry process. Data was statistically analyzed using Statistical Package for Social Science (SPSS) Version 25 for windows. Descriptive statistics (frequencies, percentages, means, and standard deviations) were performed to describe the sample characteristics. Correlational analyses were conducted to examine the relationship between the severity of dysphagia and aspiration risk among patients with neurogenic dysphagia. An alpha value of ≤ 0.05 was considered statistically significant.

Results

Table (1) illustrates that the mean age of the participants in the study was 56.30 ±10.27 years. Regarding gender, half of the participants were males (51.7%). Regarding the diagnosis of neurogenic dysphagia, 70.0% of the participants had a stroke. Concerning the mean Glasgow Coma Scale was 13.50±.70 indicating higher level of consciousness of participants. Regarding the mean SAPSII was 37.01±10.42 indicating that the mortality risk for participants is 25%.

Table (2) illustrates that the mean dysphagia severity score of the participants was 9.23 ± 1.01, indicating severe dysphagia. The mean aspiration risk score was 127.16 ± 16.43, indicating a high risk of aspiration. The mean functional oral intake score was 4.30± 0.46, suggesting that participants were able to swallow liquids only.

Table (3) demonstrates a highly statistically significant negative correlation between aspiration risk scores and dysphagia severity scores in the studied sample, with r = -0.655 (p = 0.000). This indicates that patients with more sever dysphagia experience a higher risk of aspiration. Additionally, there was a highly statistically significant negative correlation between the severity of dysphagia scores and functional oral intake in the studied sample, with r = -0.597 (p = 0.000). This suggests that patients with more severe dysphagia have a lower ability to consume food and liquids orally.

Table (4) illustrates that there was a highly statistically significant positive correlation between aspiration risk

scores and functional oral intake scores in the studied sample, with r = 0.722 (p = 0.000). This indicates that patients with a lower aspiration risk tend to have better functional oral intake.

Table (1): Demographic Characteristics and Medical Data of the Studied Sample (N=60).

Demographic Characteristics:	Studied Sample (N=60)	
	No	%
Age **Mean ± SD**	56.30±10.27	
Gender		
Male	31	51.7%
Female	29	48.3%
Diagnosis Stroke	42	70.0%
Traumatic brain injury	2	3.3%
Myathenia Gravis	4	6.7%
Guillian-Barre syndrome	12	20.0%
Glasgow Coma Scale	13.50±.70	
SAPSII	37.01±10.42	

Table (2): The Mean and Standard Deviation of the Total Dysphagia Severity, Aspiration Risk and Functional Oral Intake of the Studied Sample (N=60).

Variable	Studied Sample (N=60)
	Mean ± SD
Dysphagia Severity	9.23 ± 1.01
Aspiration Risk	127.16 ±. 16.43
Functional Oral intake	4.30± 0.46

Table (3) Relationship between Aspiration Risk, Functional Oral Intake and Severity of Dysphagia of the Studied Sample (N=60).

Items	Severity of Dysphagia (N=60)	
	r	p. value
Aspiration Risk	-.655**	**.000** HS
Functional Oral Intake	-0.597**	**0.000** HS

Note: **(ns): not significant (p value>0.05) S: significant (p value<0.05) HS: High significant (p<0.001)**

Table (4) Relationship between Aspiration Risk and Functional Oral Intake of the Studied Sample (N=60).

Items	Aspiration Risk (N=60)	
	r	p. value
Functional Oral Intake	**0.722 ** **	**0.000** HS

Discussion:

Neurogenic dysphagia is a life-threatening condition commonly observed in ICU patients. This condition significantly impacts patients' quality of life and may lead to severe medical complications such as malnutrition, dehydration, and aspiration pneumonia (Clayton et al., 2023). Aspiration pneumonia remains a leading cause of hospital readmission and mortality among ICU patients (Carda et al., 2020).

Dysphagia is not always noticeable to patients, and silent aspiration may occur without evident clinical signs (Labeit et al., 2023). While explicit aspiration is easier to identify often causing coughing, voice changes, shortness of breath, and, in severe cases, choking silent aspiration presents a greater challenge, as it lacks clear symptoms but can lead to unexplained fever and pulmonary infections (Yan et al., 2024).Patients with neurogenic dysphagia are at an increased risk of pneumonia, with the severity of dysphagia playing a significant role in this risk. The likelihood of aspiration pneumonia is even higher in patients experiencing silent aspiration (Balcerak et al., 2022).

The findings of the present study revealed a significant positive correlation between dysphagia severity and aspiration risk of the studied sample. Patients with more severe dysphagia were at a higher risk of aspiration, emphasizing the urgent need for effective management strategies to address dysphagia in ICU patients. These results align with what was reported by Shohdi et al. (2024), Dziewas et al. (2024), Kato et al. (2025), Kim et al. (2023), Lo et al. (2019), and Ibrahim et al. (2018), who examined the relationship between severity of dysphagia and risk of aspiration and found that increased dysphagia severity is an independent risk factor for a higher aspiration risk in critically ill patients.

The relationship between dysphagia severity and functional oral intake is a critical concern in clinical practice. Dysphagia severity reflects the extent of swallowing difficulty a patient experiences, while functional oral intake refers to the ability to consume food and liquids by mouth safely and sufficiently (Lee et al., 2023). As dysphagia becomes more severe, patients often face greater challenges in maintaining adequate oral intake, which may require modified diets or complete reliance on alternative feeding methods (Banda et al., 2023).

The present study revealed a significant negative correlation between dysphagia severity and functional oral intake of the study sample. This finding suggests that patients with more severe dysphagia exhibit reduced functional oral intake, further highlighting the critical impact of dysphagia on nutritional status and overall health. These results are consistent with what was reported by Suda et al. (2024), Aoyagi et al. (2021), and Furuya et al.(2020), who found that increased dysphagia severity is a key factor contributing to reduced oral intake among critically ill patients.

Limitation of The Study

- The findings of the current study are limited in their generalizability because of the convenient sample. The lack of random sampling may contribute to sample selection bias and limits the generalization of the findings.
- Participants were recruited from a single setting; thus, findings should be interpreted cautiously.

Conclusion

The findings of the present study highlight that patients with more severe dysphagia are at a higher risk of aspiration. Increased dysphagia severity is associated with a reduction in functional oral intake.

Recommendations:

Routine dysphagia screening should be implemented as a standard nursing intervention in ICUs to facilitate early identification of swallowing difficulties. Multidisciplinary collaboration involving nurses, speech therapists, and physicians is essential to optimize dysphagia management and improve patient care. Education and training should be provided to critical care nurses on effective dysphagia assessment and intervention strategies to enhance patient safety and quality of life. Future study should be conducted to investigate the impact of early dysphagia screening and intervention on patient outcomes such as nutritional status, hospitalization rates, and quality of life.

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