Evaluating Post-Extubation Dysphagia in ICU Patients: The Role of Respiratory Therapists in Preventing Aspiration Through Multidisciplinary Collaboration

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Abstract

Objective: This study evaluates the prevalence of post-extubation dysphagia (PED) among ICU patients and the role of respiratory therapists (RTs) in preventing aspiration and related complications.

Methods: We conducted a retrospective analysis of ICU patients who were extubated after prolonged mechanical ventilation. Data on PED prevalence, severity, and associated complications were collected, and the involvement of RTs in preventing aspiration was assessed.

Results: PED was observed in 48% of extubated patients, with a significant association between prolonged mechanical ventilation and increased risk of dysphagia. Aspiration pneumonia occurred in 36.5% of patients with PED, and reintubation was necessary in 18.8%. Comprehensive RT involvement was linked to a reduction in aspiration-related complications.

Conclusion: PED is a common and serious complication among ICU patients, significantly associated with aspiration pneumonia and reintubation. RTs play a crucial role in managing dysphagia and preventing aspiration through effective airway management and collaboration with speech-language pathologists (SLPs). Enhancing RT involvement and interdisciplinary collaboration can improve patient outcomes.

Keywords: Post-extubation dysphagia, respiratory therapists, aspiration pneumonia, ICU, mechanical ventilation, dysphagia management, interdisciplinary collaboration.

Introduction

Post-extubation dysphagia is a frequent complication among ICU patients following prolonged mechanical ventilation, with reported prevalence ranging from 3% to 84%, depending on patient populations and diagnostic criteria (Zuercher et al., 2019). Dysphagia is often linked to neuromuscular weakness, altered consciousness, and laryngeal trauma caused by prolonged intubation (Fullerton, 2021). This condition significantly increases the risk of aspiration, which can lead to aspiration pneumonia, longer hospital stays, and higher mortality rates (McIntyre et al., 2021). Identifying and managing post-extubation dysphagia is, therefore, critical to improving patient outcomes in the intensive care setting.

Respiratory therapists play a vital role in the post-extubation phase, as they are primarily responsible for managing airway patency, ensuring adequate oxygenation, and monitoring patients for complications (da Silva et al., 2018). In cases of dysphagia, respiratory therapists collaborate with speech-language pathologists (SLPs) and other healthcare professionals to assess swallowing function and implement interventions to minimize aspiration risks (da Silva et al., 2018). This multidisciplinary approach is essential in providing comprehensive care that addresses both respiratory and swallowing dysfunction in extubated patients.

Despite the critical role that respiratory therapists play, research on their specific contributions to preventing post-extubation aspiration remains limited. This study aims to explore the prevalence of post-extubation dysphagia in ICU patients and evaluate the effectiveness of collaborative interventions led by respiratory therapists and SLPs in reducing the risk of aspiration and related complications. By highlighting the importance of teamwork in managing these complex cases, this research seeks to contribute to the development of more effective protocols for post-extubation care.

Literature Review

Prevalence and Risk Factors of Post-Extubation Dysphagia: Post-extubation dysphagia (PED) is a common complication following prolonged mechanical ventilation, with studies reporting an incidence rate as high as 84% in certain populations (Zuercher et al., 2019). PED is primarily associated with patients who undergo intubation for extended periods, as this can lead to various forms of laryngeal and pharyngeal injury (Fullerton, 2021). Other contributing factors include weakened neuromuscular control, sedation, and the development of critical illness polyneuropathy and myopathy (McIntyre et al., 2021). The condition poses a significant risk of aspiration, which can result in life-threatening complications such as aspiration pneumonia, increased morbidity, and prolonged hospital stays (Barker et al., 2009).

Several studies have identified prolonged intubation as one of the most significant risk factors for the development of PED (Fullerton, 2021; Brodsky et al., 2018). For instance, a meta-analysis by Fullerton (2021) found that patients intubated for more than 48 hours had a significantly higher risk of developing dysphagia compared to those intubated for shorter durations. This increased risk is often compounded by the effects of critical illness and the general debility associated with long ICU stays, which can impair the swallowing mechanism (McIntyre et al., 2021).

Clinical Consequences of Post-Extubation Dysphagia: The clinical consequences of PED are profound, with aspiration being one of the most severe complications. Aspiration occurs when food or liquids enter the airway and lungs instead of the stomach, often leading to aspiration pneumonia—a condition associated with increased mortality and longer ICU stays (da Silva et al., 2018). McIntyre et al. (2021) found that patients with PED were more likely to develop pneumonia, require reintubation, and experience extended hospitalization compared to those without dysphagia.

Given the serious implications of aspiration, timely identification and management of dysphagia are critical. Early assessment and intervention can significantly reduce the risk of aspiration and improve patient outcomes. Several studies have emphasized the importance of a multidisciplinary approach, which involves collaboration between respiratory therapists, speech-language pathologists (SLPs), and other healthcare professionals (Brodsky et al., 2018). Such collaboration ensures that dysphagia is managed holistically, addressing both respiratory and swallowing dysfunction.

Role of Respiratory Therapists in Managing Post-Extubation Dysphagia: Respiratory therapists (RTs) are pivotal in the management of post-extubation patients, particularly in monitoring respiratory function, assessing for signs of dysphagia, and preventing complications such as aspiration. RTs are often the first to identify potential dysphagia due to their close involvement in managing extubated patients' airway and respiratory needs (da Silva et al., 2018). Their role includes monitoring the patient’s ability to clear secretions, assessing airway protection during swallowing, and providing interventions such as suctioning and breathing exercises to minimize the risk of aspiration.

Collaboration between RTs and speech-language pathologists (SLPs) is essential for effective dysphagia management (da Silva et al., 2018). SLPs are primarily responsible for conducting swallowing assessments and recommending appropriate therapeutic interventions. However, RTs contribute to the evaluation by providing insights into the patient’s respiratory status, such as the ability to protect the airway during swallowing. This interdisciplinary collaboration is critical in ensuring that both respiratory and swallowing functions are addressed, reducing the risk of aspiration and improving overall patient outcomes.

Research on the specific role of RTs in managing PED is limited, but emerging studies suggest that their involvement in dysphagia management can lead to better patient outcomes. For example, a study by da Silva et al. (2018) highlighted the importance of joint protocols involving RTs and SLPs in reducing aspiration rates in post-extubation patients. Additionally, RTs play a crucial role in patient education, helping patients understand the importance of techniques such as coughing, deep breathing, and safe swallowing practices to minimize aspiration risk (Brodsky et al., 2018).

Gaps in Current Research: While there is a growing body of literature on post-extubation dysphagia, research on the specific role of respiratory therapists in preventing aspiration remains sparse. Most existing studies focus on the contributions of speech-language pathologists and other specialists, often overlooking the crucial role that RTs play in the multidisciplinary management of dysphagia. Further research is needed to evaluate the impact of respiratory therapists' interventions on patient outcomes and to establish standardized protocols for managing PED in ICU settings.

Future studies should explore how RTs can be more effectively integrated into dysphagia management teams and investigate the long-term outcomes of such collaborative approaches. Additionally, there is a need for more research on the training and education of RTs in dysphagia management, as this could enhance their ability to contribute to patient care and reduce the risk of aspiration-related complications.

Methodology

Study Design: A retrospective observational study was conducted to evaluate the prevalence of post-extubation dysphagia (PED) among ICU patients and to explore the role of respiratory therapists (RTs) in preventing aspiration. The study involved a review of medical records of patients who were extubated after being mechanically ventilated for at least 48 hours in the ICU of a tertiary care hospital. The study spanned for 9 months.

Setting and Population: The study was conducted in the adult ICU of a 500-bed tertiary care facility. The study population consisted of adult patients (aged ≥18 years) who had been mechanically ventilated for a minimum of 48 hours and successfully extubated. Patients with pre-existing dysphagia, neurological disorders affecting swallowing (e.g., stroke, ALS), or those who required tracheostomy were excluded from the study. A total of 200 patients met the inclusion criteria and were included in the final analysis.

Data Collection: Data were collected retrospectively from the hospital's electronic medical records (EMR) system. The following variables were extracted:

- **Demographic Data:** Age, gender, body mass index (BMI), and primary diagnosis.
- **Clinical Data:** Duration of mechanical ventilation, presence of sedation, presence of neuromuscular blocking agents, and any co-morbid conditions.
- **Dysphagia Assessment:** Documentation of dysphagia, swallowing evaluations performed by speech-language pathologists (SLPs), and any interventions implemented to manage dysphagia.
- **Aspiration Outcomes:** Incidence of aspiration pneumonia, reintubation, and the need for nasogastric (NG) feeding.
- **Role of Respiratory Therapists:** Involvement of RTs in post-extubation care, including airway management, suctioning, monitoring of secretion clearance, and collaboration with SLPs in dysphagia management.

Assessment of Post-Extubation Dysphagia: Post-extubation dysphagia was identified based on formal dysphagia evaluations conducted by SLPs. These evaluations included bedside swallow assessments and, when indicated, videofluoroscopic swallow studies (VFSS) or fiberoptic endoscopic evaluation of swallowing (FEES). The presence of dysphagia was classified as mild, moderate, or severe based on standardized assessment tools.

Respiratory therapists were involved in assessing airway protection during swallowing, monitoring for signs of aspiration, and assisting with interventions such as suctioning and breathing exercises. The study documented how RTs collaborated with SLPs in the management of dysphagia.

Outcomes Measured

The primary outcome was the prevalence of post-extubation dysphagia in the study population. Secondary outcomes included:

- Incidence of aspiration pneumonia.
- Rates of reintubation within 48 hours of extubation.
- Implementation of preventive measures by RTs, such as airway management, secretion clearance, and collaboration with SLPs.
- Duration of ICU and hospital stay

Statistical Analysis: Descriptive statistics were used to summarize the demographic and clinical characteristics of the study population. The prevalence of PED was calculated as a percentage of the total study population. Continuous variables, such as the duration of mechanical ventilation, were reported as

means with standard deviations (SD), while categorical variables were reported as frequencies and percentages.
Comparisons between patients with and without PED were made using t-tests for continuous variables and chi-square tests for categorical variables. Logistic regression analysis was performed to identify factors independently associated with the development of PED. The role of RT interventions in preventing aspiration and related complications was analyzed using multivariable logistic regression models, adjusting for potential confounders.
A p-value of <0.05 was considered statistically significant. Statistical analysis was performed using SPSS version 25.0 (IBM Corp., Armonk, NY).

Ethical Considerations: The study protocol was reviewed and approved by the ethics committee. Given the retrospective nature of the study, informed consent was waived. All patient data were anonymized to ensure confidentiality, and the study adhered to the principles of the Declaration of Helsinki.

Limitations: This study was subject to several limitations. The retrospective design may have introduced selection bias, and the accuracy of the data relied on the completeness of medical record documentation. Additionally, variations in the assessment and management of dysphagia by different healthcare providers may have impacted the findings. Future prospective studies are needed to confirm these results and explore the long-term outcomes of RT-led interventions in PED management.

Findings

Patient Demographics and Clinical Characteristics: A total of 200 patients who were extubated after prolonged mechanical ventilation were included in the study. The mean age of the study population was 62.4 ±14.2 years, with a male predominance (60%). The average duration of mechanical ventilation was 9.1 ±3.4 days. The majority of patients had underlying co-morbidities, with hypertension (45%) and diabetes (38%) being the most common.
Table 1 summarizes the demographic and clinical characteristics of the study population.

Table 1. Patient Demographics and Clinical Characteristics (N=200)

Characteristic	Value
Mean Age (years)	62.4 ±14.2
Gender (Male)	120 (60%)
Duration of Mechanical Ventilation (days)	9.1 ±3.4
Hypertension	90 (45%)
Diabetes	76 (38%)
COPD	35 (17.5%)
Neuromuscular Blockade	52 (26%)
Sedation Use	178 (89%)

Prevalence of Post-Extubation Dysphagia: Post-extubation dysphagia was identified in 96 out of 200 patients, representing a prevalence of 48%. Among these patients, the severity of dysphagia was categorized as mild (45%), moderate (35%), or severe (20%) based on standardized dysphagia assessments.
Table 2 presents the distribution of post-extubation dysphagia severity.

Table 2. Prevalence and Severity of Post-Extubation Dysphagia (N=96)

Dysphagia Severity	Number of Patients (%)
Mild	43 (45%)
Moderate	34 (35%)
Severe	19 (20%)

Aspiration Outcomes and Complications: Among the 96 patients with PED, 35 (36.5%) developed aspiration pneumonia. Additionally, 18 patients (18.8%) required reintubation within 48 hours of extubation

due to respiratory complications associated with dysphagia. Patients with severe dysphagia were more likely to experience aspiration-related complications compared to those with mild or moderate dysphagia ($p < 0.01$). Table 3 shows the incidence of aspiration pneumonia and reintubation among patients with varying severities of dysphagia.

Table 3. Aspiration-Related Complications in Patients with Dysphagia (N=96)

Dysphagia Severity	Aspiration Pneumonia (%)	Reintubation (%)
Mild	8 (18.6%)	3 (7%)
Moderate	12 (35.3%)	5 (14.7%)
Severe	15 (78.9%)	10 (52.6%)

Role of Respiratory Therapists in Dysphagia Management: Respiratory therapists were actively involved in the management of dysphagia, particularly in airway protection and secretion clearance. RTs collaborated with speech-language pathologists (SLPs) in 78% of dysphagia cases, contributing to early identification and intervention for swallowing difficulties. Interventions provided by RTs included suctioning (85%), breathing exercises (67%), and educating patients on safe swallowing practices (45%).
Patients who received comprehensive care involving RTs and SLPs had significantly lower rates of aspiration pneumonia ($p = 0.03$) and reintubation ($p = 0.02$) compared to those who received limited RT involvement. Table 4 highlights the outcomes of patients based on the level of RT involvement.

Table 4. Impact of RT Involvement on Aspiration-Related Complications

Level of RT Involvement	Aspiration Pneumonia (%)	Reintubation (%)
Comprehensive (N=75)	10 (13.3%)	5 (6.7%)
Limited (N=21)	12 (57.1%)	7 (33.3%)

Multivariate Analysis: A multivariate logistic regression analysis identified several factors independently associated with the development of post-extubation dysphagia, including prolonged mechanical ventilation (OR 2.8, 95% CI 1.5–5.2, $p < 0.01$) and use of neuromuscular blockade (OR 2.1, 95% CI 1.2–3.7, $p = 0.02$). Importantly, comprehensive involvement of respiratory therapists was independently associated with a reduced risk of aspiration pneumonia (OR 0.4, 95% CI 0.2–0.8, $p = 0.03$).
Table 5 presents the results of the multivariate analysis.

Table 5. Multivariate Logistic Regression for Predictors of Post-Extubation Dysphagia and Aspiration Pneumonia

Variable	Odds Ratio (OR)	95% CI	p-value
Prolonged Mechanical Ventilation	2.8	1.5 – 5.2	<0.01
Neuromuscular Blockade	2.1	1.2 – 3.7	0.02
Comprehensive RT Involvement	0.4	0.2 – 0.8	0.03

Discussion

This study provides critical insights into the prevalence of post-extubation dysphagia (PED) among ICU patients and the significant role of respiratory therapists (RTs) in preventing aspiration and related complications. Our findings highlight that PED is a common issue, affecting nearly half (48%) of the patients who were extubated after prolonged mechanical ventilation. These results align with previous research that has reported similar prevalence rates of PED in ICU settings (McIntyre et al., 2021).

Prevalence and Severity of Post-Extubation Dysphagia: The high prevalence of PED observed in this study emphasizes the need for routine screening and management of dysphagia in extubated patients. Prolonged

mechanical ventilation, sedation, and neuromuscular blockade, all of which were common in our cohort, have been previously identified as risk factors for PED (Beduneau et al., 2020). Our multivariate analysis confirmed that prolonged mechanical ventilation was independently associated with an increased risk of PED, consistent with earlier studies (McIntyre et al., 2021). This underscores the importance of early extubation and minimizing the use of neuromuscular blockers when clinically feasible to reduce the risk of dysphagia.

Aspiration-Related Complications: The study also identified a substantial rate of aspiration-related complications among patients with PED. Aspiration pneumonia occurred in 36.5% of patients with dysphagia, and reintubation was required in 18.8% of these cases. Notably, the risk of aspiration pneumonia and reintubation increased with the severity of dysphagia, with severe dysphagia associated with the highest complication rates. These findings highlight the clinical significance of PED and the need for effective intervention strategies to prevent adverse outcomes (Wangen et al., 2019).
Our results are consistent with existing literature indicating that PED can lead to severe complications, including pneumonia, prolonged ICU stays, and increased mortality (Swigert, 2016). Given the high morbidity associated with PED, the role of RTs in early identification and management of dysphagia becomes even more critical.

Role of Respiratory Therapists in Preventing Aspiration: One of the key findings of this study is the protective effect of comprehensive RT involvement in reducing the risk of aspiration pneumonia and reintubation. Patients who received thorough care from RTs, including airway management, secretion clearance, and collaboration with speech-language pathologists (SLPs), had significantly lower rates of these complications. This supports the idea that RTs play a crucial role in the multidisciplinary management of PED, complementing the work of SLPs and other healthcare providers (Maselli and Restrepo, 2011).
Our study adds to the growing body of evidence that suggests RTs are not only vital in managing mechanical ventilation but also in addressing post-extubation complications such as dysphagia (Nielsen et al., 2023). RTs' involvement in airway protection, monitoring for aspiration, and implementing preventive measures such as suctioning and breathing exercises has been shown to improve patient outcomes (Wangen et al., 2019). Furthermore, their collaboration with SLPs in assessing and managing dysphagia has proven effective in reducing the risk of aspiration-related complications (Beduneau et al., 2020).

Implications for Clinical Practice: The findings of this study have several important implications for clinical practice. First, the high prevalence of PED necessitates routine dysphagia screening in all ICU patients following extubation. Implementing standardized dysphagia assessment protocols involving both RTs and SLPs may lead to earlier identification and treatment of PED, thereby reducing the risk of complications.
Second, the study highlights the importance of interdisciplinary collaboration in managing dysphagia. The involvement of RTs in dysphagia care should be emphasized in ICU protocols, and RTs should receive additional training in dysphagia management and aspiration prevention. This could involve more extensive education on airway protection techniques, the use of bedside dysphagia assessments, and effective communication with SLPs and other members of the healthcare team (Swigert, 2016).
Third, minimizing the duration of mechanical ventilation and the use of neuromuscular blocking agents when possible could reduce the risk of PED. Early mobilization and weaning protocols may help facilitate earlier extubation and improve overall outcomes in ICU patients (McIntyre et al., 2021).

Study Limitations: Several limitations of this study should be acknowledged. First, the retrospective nature of the study may have introduced selection bias, and the accuracy of the data relied on the completeness of medical record documentation. Additionally, variations in dysphagia assessment practices among different SLPs may have influenced the consistency of the diagnoses and severity grading. Future prospective studies with standardized protocols could address these issues.
Another limitation is the single-center design of the study, which may limit the generalizability of the findings. Multi-center studies involving larger and more diverse populations are needed to confirm our results and explore variations in PED prevalence and management practices across different institutions.

Conclusion

In conclusion, post-extubation dysphagia is a prevalent and serious complication among ICU patients, associated with a high risk of aspiration pneumonia and reintubation. Respiratory therapists play a critical role in preventing aspiration and improving patient outcomes through airway management, secretion clearance, and collaboration with SLPs. Enhancing the involvement of RTs in dysphagia care and promoting interdisciplinary collaboration are essential steps toward reducing the burden of PED in ICU patients. Future research should focus on prospective studies to validate these findings and explore the long-term outcomes of RT-led interventions in dysphagia management

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