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Post-extubation Dysphagia: A Problem Needing Multidisciplinary Efforts

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Despite having the tools and techniques for tracheal intubation for >4,000 years,¹ and performing oral intubation with positive pressure mechanical ventilation for >50 years,² only recently has attention focused on patient issues following extubation, particularly swallowing-related complications. The endotracheal tube traverses the oropharynx, larynx, and trachea, with potential for laryngeal and tracheal injury, voice dysfunction, and dysphagia (i.e., swallowing dysfunction). Aspiration (i.e., one consequence of dysphagia) is present in 40% of medical-surgical and cardiac patients post-extubation.^{3–5} When an instrumental evaluation of swallowing demonstrates dysphagia with aspiration, there are important clinical concerns regarding pneumonia,⁶ with implications for the intensive care unit (ICU) team and other clinicians, including speech-language pathologists/therapists (SLPs/SLTs), otolaryngologists, gastroenterologists, pulmonologists, and radiologists. Unfortunately, there is great variability in screening and diagnosing dysphagia across ICUs and hospitals^{7,8} – creating a new frontier for research and quality improvement activities.⁹ Herein, we discuss selected concerns regarding dysphagia in ICU patients post-extubation and outline opportunities for multidisciplinary management.

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Conflict of Interest

The authors have no conflicts of interest to declare.

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Mechanisms of Dysphagia Post-extubation

Six mechanisms for post-extubation dysphagia in critically ill patients have been identified: trauma, neuromuscular weakness, altered sensation, impaired cognition, gastroesophageal reflux, and dyssynchronous breathing and swallowing.¹⁰ Duration of intubation is associated with some of these mechanisms.^{11,12} Each mechanism alone could be responsible for dysphagia; however, dysphagia severity may involve multiple mechanisms (Table 1). Nurse screening (see below) in the ICU and post-ICU wards play a vital role in recognizing signs and symptoms of dysphagia caused by these mechanisms, including coughing, choking, wet vocal quality, pocketing food, drooling, and difficulty with swallowing different consistencies of foods and liquids, often indicating the need for formal evaluation. Additionally, nursing staff often provide monitoring and assistance with implementing compensatory strategies during meals and encouraging completion of recommended exercises by SLPs/SLTs.

Breathing-Swallowing Linkages

Breathing and swallowing share the pharynx,¹³ necessitating careful monitoring of the aerodigestive system. Healthy adults demonstrate little variation in the tight linkage of breathing-swallowing coordination¹⁴ and airway closure during swallowing, but swallowing effectively becomes halted in the presence of an endotracheal tube. This tight linkage – specifically anatomical movements to protect the airway during swallowing – may be disrupted by intubation and muscle weakness during critical illness.¹⁵ Deleterious effects on breathing-swallowing coordination have been reported in healthy adults given morphine and midazolam,¹⁶ raising potentially important implications for critically ill patients. Expanded investigation into post-extubation breathing-swallowing coordination is important to further understand parameters that are conducive to safe swallowing.¹⁷ Along with the ICU team, SLPs/SLTs, otolaryngologists, and pulmonologists are specialists that assess and treat swallowing and airway function, and identify and treat related disease processes.

Screening Swallowing Function Post-extubation

In the United States, the timing and process of screening/evaluation by SLPs/SLTs is variable,⁸ often beginning 24 hours post-extubation.⁷ Although the reason for delayed assessment is unclear, it may be the consequence of a study of 79 patients that demonstrated a significantly reduced delay in patients' "swallowing reflex" immediately after extubation compared with assessment at >24 hours.¹⁸ However, this study has many limitations, including not directly assessing or visualizing swallowing and administering liquid boluses of 1 ml that are not clinically relevant. Two more recent studies evaluated screening for post-extubation dysphagia-related aspiration, both using the 3-oz. water swallow test and both *without* a 24-hour delay in assessment if patients were otherwise clinically appropriate: the *Yale Swallow Protocol*^{19,20} and *Post-extubation Dysphagia Screening*.²¹ The *Yale Swallow Protocol*, using the flexible endoscopic evaluation of swallowing (FEES) as its reference standard, demonstrated 97% sensitivity and 49% specificity in hospitalized patients, including >200 ICU patients post-extubation.^{20,22} Using the *Yale Swallow Protocol's* 3-oz. water swallow test as a reference standard,²² the *Post-extubation Dysphagia*

Screening protocol demonstrated 81% sensitivity and 69% specificity in ICU patients.²¹ Both approaches concluded that patients' clinical readiness should be a marker for screening/evaluation, not a fixed duration of time post-extubation, and both are recommended for use post-extubation. Frequently, nurses conduct such screenings, but any trained clinician may be appropriate. Regardless of dysphagia screening method, a cautious approach that includes clinician monitoring of signs and symptoms should be used when starting post-extubation patients on an oral diet.

Instrumental Evaluation of Swallowing Function

After a failed screening test or concern based on clinician evaluation of swallowing, an instrumental evaluation may be necessary. Although SLPs/SLTs most often perform clinical evaluations, their scope of practice for instrumental evaluations varies across settings. An instrumental evaluation has 5 objectives: 1) identify the physiological component(s) of disordered swallowing (i.e., oral, pharyngeal, esophageal impairments), 2) judge severity for each impairment, 3) determine safe and appropriate consistencies and route/manner of nutritional intake, 4) identify the need for further evaluation, and 5) identify and evaluate the effectiveness of compensatory interventions (e.g., chin tuck) and treatment strategies (e.g., exercises). FEES and the videofluoroscopic swallow study (VFSS) are the two instrumental evaluations of swallowing that are reference standards for dysphagia evaluation.²³ FEES and VFSS tests are *not* pass/fail evaluations; rather, each assesses key components of swallowing physiology. Unlike VFSS, FEES does not use ionizing radiation, allowing longer evaluation periods to sample behaviors/swallowing physiology with a direct view to evaluate the nasopharynx, pharynx, and larynx. Alternatively, VFSS provides views of the oral, pharyngeal, and esophageal swallow, assessing swallowing function across the aerodigestive system. Specifically in the ICU, FEES has important advantages of being a portable bedside assessment, providing visual assessment of potential laryngeal injury¹² and secretion management. FEES is also feasible and well-tolerated, given that modern nasoendoscopes are very small (<3.0 mm), and may be performed by a trained SLP/SLT or otolaryngologist without sedation or topical medications.^{24,25} Because SLPs/SLTs treat swallowing disorders, their role in directly evaluating patients can be invaluable. Concerns for laryngeal or esophageal impairments should result in an otolaryngology or gastroenterology referral, respectively. Minimum requirements to complete a FEES are an awake and cooperative patient permitted to ingest liquids and foods, and has cardiopulmonary stability and no major bleeding risk.

Multiple Disciplines for One Cause—The Patient

Dysphagia is associated with increased inpatient costs, length of stay, and mortality.²⁶ Early screening and evaluation of swallowing function may reduce these risks in ICU patients post-extubation.⁴ To perform early screening and evaluation effectively, trained clinicians involving multiple disciplines must systematically address integrity of the anatomy, neuromuscular strength and sensation, cognition, gastrointestinal function, and breathing-swallowing coordination. Interdisciplinary care is important to address potential complications from dysphagia in patients post-extubation.²⁷

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Table 1.

Considerations for interdisciplinary management of dysphagia in ICU patients after extubation.

Issue	Management consideration	Responsible discipline(s)	Example References*
<i>Trauma to the oropharynx and larynx</i>			
Laryngeal injury, abnormal laryngeal motor reflexes	Laryngoscopy/voice evaluation	SLP, ENT	1–13
	Voice treatment	SLP, CC, ENT	14–19
<i>Neuromuscular weakness</i>			
Reduced airway closure and/or reduced upper esophageal sphincter opening	Flexible Endoscopic Evaluation of Swallowing (FEES)	SLP, ENT	20–22
	Videofluoroscopic swallow study (VFSS)	SLP, Rad	22
	Treatment/management	SLP	23–26
Tongue weakness	Cranial nerve exam/tongue strengthening exercise	SLP, CC, PMR, RN, NP, Neuro	27,28
Feeding (hand-to-mouth control) difficulties	Evaluation for ICU-acquired weakness, and impaired coordination and fine motor control	OT, PT, CC, PMR, RN, NP	29
Generalized weakness	Evaluation of strength (e.g., manual muscle testing, dynamometry)	OT, PT, CC, PMR, RN, NP	30
<i>Altered sensation</i>			
Medications	Raising awareness; monitoring side effects, and reassessing medications	RN, CC, PMR, NP, SLP, ENT, GI	31,32
Tongue sensory changes	Oral motor/cranial nerve exam	RN, CC, PMR, NP, SLP, ENT, Neuro	28
Glottis sensory changes	Laryngoscopy/voice evaluation	SLP, ENT	4,10–12,33
<i>Impaired cognition</i>			
Impaired arousal, attention, memory, communication, thought organization, problem solving, and reasoning	Screening/evaluation and management of delirium and cognition	RN, CC, PMR, NP, SLP, Psych, OT	34,35
<i>Gastroesophageal reflux</i>			
Aspiration, pneumonia, pneumonitis	Medical management	CC, GI	36–40
<i>Dyssynchronous breathing and swallowing</i>			
Changes to breathing that impact swallowing	Non-invasive monitoring	CC, GI	31,32

Abbreviations: ENT, otolaryngologist; GI, gastroenterologist; CC, critical care physician; Neuro, neurologist; NP, nurse practitioner (may also include physician assistant); OT, occupational therapist; PMR, physiatrist; Psych, psychologist/psychiatrist; PT, physical therapist; Rad, radiologist; RN, critical care nurse; SLP/SLT, speech-language pathologist/speech-language therapist

*References are listed in the electronic supplementary material.