

Swallowing Dysfunction After Critical Illness

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Critical care practitioners must frequently make decisions about their patients' ability to swallow food, liquids, and pills. These decisions can be particularly difficult given the incompletely defined epidemiology, diagnostic criteria, and prognostic features of swallowing disorders in critically ill patients. Furthermore, the consequences of improper decisions—namely, aspiration, malnutrition, hunger, and thirst—can be devastating to patients and their families. This review outlines the problem of swallowing dysfunction in critically ill patients and then addresses the most clinically relevant questions that critical care practitioners face today. First, we review the epidemiology of swallowing dysfunction in critically ill patients. Next, we describe the different diagnostic tests for swallowing dysfunction and describe a general approach to the initial assessment for swallowing disorders. Finally, we explore the existing treatments for swallowing dysfunction. Given the burden of swallowing dysfunction in patients recovering from critical illness, enabling critical care practitioners to manage these disorders, while stimulating new investigation into their pathophysiology, diagnosis, and management, will enhance our care of critically ill patients.

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ABBREVIATIONS: FEES = fiber-optic endoscopic evaluation of swallowing; NMES = neuromuscular electrical stimulation; VFSS = videofluoroscopic swallow study

“Let food be thy medicine and medicine be thy food.”

Hippocrates

About every 90 s in the United States, a critical care practitioner makes a decision about the diet for a patient who was recently extubated.^{1,2} As Hippocrates may have predicted, these decisions surrounding when a patient should resume attempts to swallow food, liquids, and pills can be difficult. Patients with swallowing problems who start to eat and drink could aspirate, and subsequently develop acute respiratory failure and increase their risk of developing

a health-care-associated pneumonia.³⁻⁵

However, depriving oral nutrition to patients who can effectively swallow results in thirst, hunger, feeding tube placement, electrolyte disturbances, and increased caregiver burden.

The decision of when to allow a patient who is recently extubated to begin to eat and drink is complicated for at least two reasons. First, swallowing problems occur relatively frequently in survivors of critical illness. Second, the diagnostic criteria, prognostic features, and treatment options for these disorders remain incompletely defined.

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Increasingly, critical care practitioners delegate the decision of when to resume oral feeding to the nationally accredited discipline of speech-language pathology. Over the 9-year period between 2002 and 2011, speech-language pathologists increased their inpatient evaluations for swallowing disorders by nearly 20%.⁶ Ninety percent of the time, a speech-language pathologist requires a consult from the treating physician to become involved in the care of critical illness survivors.⁷ In part due to the morbidity of dysfunctional swallowing and the increasing resources required to evaluate and treat swallowing disorders, the national yearly cost of swallowing problems in hospitalized patients is estimated to be over \$500 million dollars.⁸

This review seeks to shed light on the particular questions faced by critical care practitioners. Throughout the review, we will use the following terms: dysphagia or swallowing dysfunction refers to the general phenomena of abnormal swallowing, and aspiration denotes oral contents spilling into the trachea. We will address six questions that are relevant to patients who are recently extubated.

How Common Are Swallowing Disorders in Critically Ill Patients?

The frequency of dysphagia and aspiration in critically ill patients has not been definitively determined. Some of the variability in the estimated frequency of dysphagia is related to the lack of universally applied diagnostic criteria, cohort differences, and variation in the timing of the swallowing evaluation. An additional factor in determining the prevalence of dysphagia is whether swallowing dysfunction in these patients predates ICU admission or whether it developed as a result of critical illness. Conservative estimates suggest that a minimum of 20% of all extubated survivors of acute respiratory failure suffer from an abnormality in swallowing function.⁹ Barker and colleagues¹⁰ in Toronto, Ontario, Canada, demonstrated that 51% (130 of 254) of cardiac surgery patients who received mechanical ventilation for >48 h had abnormal swallowing as detected by bedside swallow evaluation. Additionally, El Solh and colleagues¹¹ demonstrated endoscopic evidence of aspiration in 44% of recently extubated patients (37 of 84). In a large cohort of survivors of critical illness, 15% of all ICU admissions (374 of 2,484) had dysfunctional swallowing, despite the fact that over two-thirds of patients received no formal evaluation of their swallowing function.³ While these studies attempted to exclude patients with preexisting swallowing dysfunction, it is possible that existing estimates include patients with

previously undiagnosed dysphagia that is subsequently identified after critical illness.

In Critically Ill Patients, How Long Do Swallowing Disorders Persist?

Long-term neurologic impairment is an important and common complication of critical illness.¹²⁻¹⁶ However, the significance and duration of dysphagia in survivors of critical illness is relatively unknown. Only a few studies examining extubated survivors of acute respiratory failure have included follow-up swallow evaluations. At 5 days, and then 14 days postextubation, 40% and 14% of elderly patients had endoscopically confirmed aspiration. In another study, de Larminat and colleagues¹⁷ used a submental electromyogram to determine swallowing efficiency, defined as the latency between installation of liquid at the level of the pharynx and the initiation of swallowing. This study demonstrated improvement in swallowing delay in all patients 7 days after extubation. Finally, in a retrospective cohort trial, 35% of those patients with swallowing dysfunction at the time of extubation had persistent swallowing abnormalities at the time of hospital discharge.³ Most likely, the underlying mechanism of swallowing dysfunction is the strongest determinant of the duration of dysfunction. For example, mild laryngeal sensory abnormalities caused by local edema may resolve rather quickly. However, laryngeal neuromuscular dysfunction, or more significant damage to laryngeal tissues, may persist for a longer duration of time.¹⁸

What Specific Features of Aspiration Lead to Clinically Significant Changes in Patient Outcomes?

In patients recovering from a cerebrovascular accident, aspiration that is suggested by a bedside swallow evaluation has been associated with poorer outcomes, such as the development of pneumonia.⁴ The association between aspiration and pneumonia exists regardless of whether aspiration occurs with coughing or occurs “silently” (without signs or symptoms).¹⁹⁻²¹ “Silent” aspiration is also associated with the development of pneumonia when quantified by pepsin in the respiratory secretions of tube-fed patients who are mechanically ventilated.⁵ Importantly, these studies only suggest an association between aspiration and pneumonia, and these associations could be biased by confounding variables, such as other comorbidities or greater severity of illness. In a large study of recently extubated survivors of acute respiratory failure that attempted to control for illness severity, the presence of swallowing dysfunction

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