

**Clinical
Management of
Swallowing Disorders**

FOURTH EDITION

Clinical Management of Swallowing Disorders

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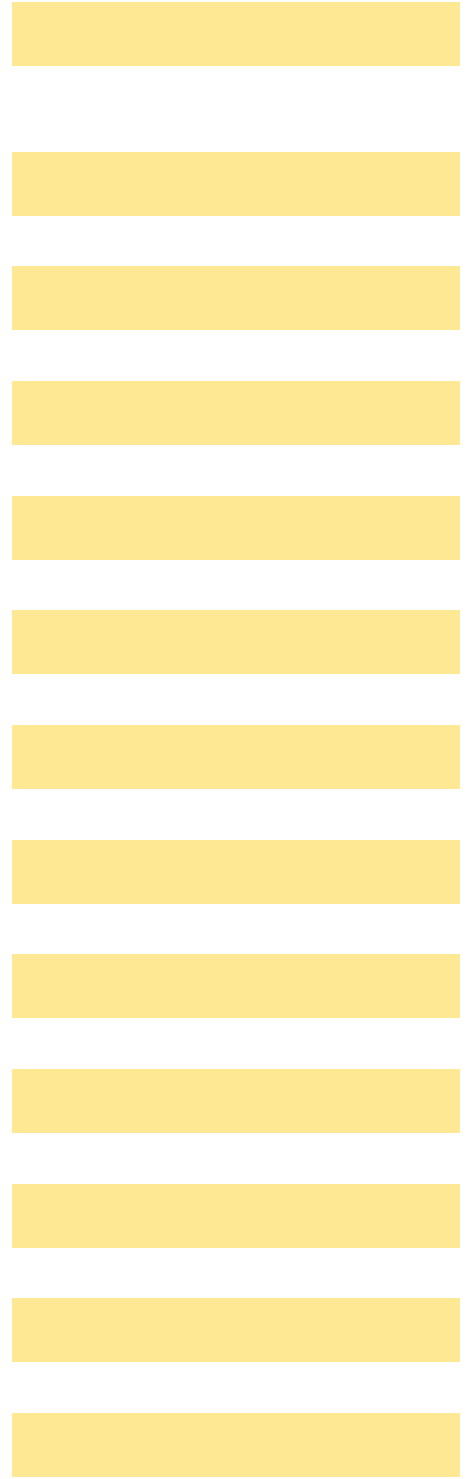
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Preface

Clinical Management of Swallowing Disorders, Fourth Edition, has been a core swallowing textbook for the past 15 years. The *Fourth Edition* is now updated with full color images, video examples of normal swallowing and actual patients, and improved tables. This text addresses the needs of students who will treat swallowing disorders as well as those clinicians who currently treat swallowing disorders in hospitals, rehabilitation centers, nursing homes, and private outpatient clinics. *Clinical Management of Swallowing Disorders, Fourth Edition*, examines the diagnosis and treatment of swallowing disorders in children and adults. The text emphasizes team management, swallowing safety, nutrition, behavioral treatments, and surgical options. A significant number of changes have been added to bring the reader up to date in all aspects of the management of swallowing disorders. Dr. Karen Chan from the University of Hong Kong, who currently teaches swallowing disorders, has joined Drs. Murry and Carrau as an author for this *Fourth Edition*. She brings an international flavor and a broad range of knowledge to the text.

The essential aspects of dysphagia management are presented in a format that both beginners and clinicians needing a practical update on dysphagia will find useful. Because of our daily clinical involvement treating swallowing disorders in major teaching institutions and teaching this information to students, we saw a need to revise and update the text that continues to be well accepted by clinicians, students, and teachers. This book addresses clinical issues at the current level of clinical understanding. The material contained in the *Clinical Management of Swallowing Disorders, Fourth Edition*, derives from a vast storehouse of recent knowledge and academic pursuits, along with our daily experiences from our multispecialty swallowing disorder clinics and research activities. Since the third edition was published, new evidence has demonstrated the importance of early intervention and aggressive treatment of dysphagia. Outcome data are now available to show the importance of proper assessments and treatments to deter and prevent aspiration and improve patients' quality of life. The *Fourth Edition* addresses clinical issues through clinical evidence and case studies. We have distilled the complexity of the pathophysiology of dysphagia to a practical level that can be absorbed by students and clinicians. Practical treatment options for a wide variety of swallowing problems with medical, surgical, and behavioral treatment models are concisely presented.



Throughout the book, certain terms are highlighted. These terms, which are germinal to the understanding of swallowing, are briefly explained in the text and some of the terms are further expanded in the Glossary. However, the reader may want to pursue these in greater depth, thus, the reason for highlighting them. We have tried to maintain the focus on treatment of swallowing disorders and have purposely avoided long discussions on the causes and complications of many neuromuscular diseases and neurological conditions that result in dysphagia. Rather, we have focused on the essentials of assessments and treatment of swallowing in those patients.

We now work in 3 separate universities, but we continue to share a philosophy that focuses on a multispecialty treatment approach based on sound research where available, consistent clinical methods, and the review of the outcomes of treatment to enhance our future clinical care. In most chapters, video examinations of case examples are provided.

Chapter One presents the clinical scope of dysphagia—who has dysphagia, the indications for intervention, the importance of treating dysphagia, and the relationship of dysphagia to associated medical conditions. A review of the extent of swallowing disorders in hospitals, nursing homes, and otherwise healthy individuals is provided. Video examples of normal swallowing are part of this chapter. There are almost no medical conditions or diseases in which swallowing disorders do not occur. While many swallowing disorders may be temporary, the need to intervene early and address them must be considered in light of the primary disease or disorder.

Chapter Two reviews the essential anatomy and function of the swallowing mechanism. We have chosen to present a summary of normal swallowing anatomy along with a concise review of the contributions of the cranial nerves rather than an extensive anatomic and neuroanatomic description of swallowing in keeping with the clinical focus of this text. The contributions of the cranial nerves are presented in tables that the clinician can easily access for later use. In the *Fourth Edition*, the current understanding of the interaction of the phases of swallowing is discussed. In this addition, we have added a review of the sensory information that, in

the past, has been given little or no attention in much of the swallowing literature.

Chapter Three has been extensively revised to provide current reviews and descriptions of swallowing disorders that arise from various neurological and head and neck disorders and diseases. Definitions of aspiration and aspiration pneumonia are given. An updated list of diseases with their major associated swallowing problems along with video examples is found in this chapter. An array of tables accompanies this chapter, which provides quick access to diseases and disorders and the swallowing problems associated with these disorders. In addition, the effects of medication on swallowing are discussed.

In **Chapter Four**, we present an updated overview of swallowing disorders arising from surgical interventions. With the increasing number of in-office and operating room surgical procedures, there is a greater need to understand those procedures and how they will affect swallowing in the short and long terms. The effects of surgery to the head, neck, and upper airway always produce a swallowing disorder. While many of these problems are temporary, the swallowing team must acutely manage them. The authors relate their daily experiences in the team management of these disorders. Long-term swallowing disorders arising from oral cancer or skull base surgical procedures are treated from the swallowing clinician's reference. Indications for aggressive and conservative surgical treatments and follow-up management are presented in this chapter.

Chapter Five has been extensively revised to focus on the clinical swallow evaluation (CSE), the starting point for swallowing management. We begin this chapter with an extensive review of commonly used clinician-based screening protocols and patient self-assessment tools. This then becomes the basis for subsequent testing and management. The different components of a full clinical swallow evaluation (CSE) are then described in the sequence of how they may appear in a typical evaluation session. While the CSE is rarely the only evaluation of swallowing, it is an essential first step in the management process. Moreover, our experience with the CSE has led us to identify appropriate instrumental tests to be done subsequently to identify additional tests and consultations early in the treatment process.

Chapter Six is a completely new chapter in the *Fourth Edition* that focuses on the instrumental evaluation of swallowing. Importance is placed upon the indications for instrumental tests and criteria for test selection. We have updated the procedures and recommendations for different instrumental tests based on recent evidence. Video examples of modified barium swallow (MBS) examinations and flexible endoscopic evaluations of swallowing (FEES) are included to illustrate the use of these instruments.

Chapter Seven presents the nonsurgical treatment approaches to swallowing. This chapter starts with an introduction to evidence-based practice and a multidisciplinary approach to swallowing therapy. This chapter has been revised extensively based on the plethora of current information that has been developed since the third edition was published. Techniques are divided in compensatory swallowing therapy and rehabilitative swallowing therapy. *Note:* these terms are specifically defined in the *Fourth Edition*. Since the majority of treatments for swallowing disorders are nonsurgical, this important chapter outlines exercises for improving oral motor strength, bolus propulsion, and swallowing safety. Extensive references to evidence for various procedures are provided. Recent developments in the use of electrical stimulation and cortical neuro-modulating methods are reviewed and discussed in light of new evidence for their use.

Chapter Eight addresses nutrition and the collaboration with nutrition specialists. The importance of working with a registered dietitian is now becoming more important in light of the various food options and food consistencies for patients. A unique aspect of this chapter is the explanation of the properties of liquids and foods that clinicians can understand. The introduction to rheology as a characteristic of foods and liquids is presented. Although the terms are new to speech-language pathologist, they are part of the everyday activities in a swallowing clinic. The latest framework for foods and drinks developed by the International Dysphagia Diet Standardization Initiative (IDDSI) is fully described with current evidence. Nonoral feeding methods are also presented with current evidence. Malnutrition and dehydration, 2 factors that affect recovery from dysphagia, are discussed in

relation to specific populations. A completely new section on ethical considerations has been added to this chapter.

Chapter Nine has been revised and expanded to include the assessment of pediatric swallowing disorders. In Chapter Nine, the focus is on a thorough assessment of the infant and the swallowing disorders that occur at birth and in childhood. The case history takes on a special importance since it includes the parents and others who may be involved with the birth, growth, and development of the child. The anatomy and physiology of the child is discussed with attention to developmental milestones of feeding and eating. The importance of the child's ever-changing behavior as it relates to eating is outlined. A survey of the most common disorders that have an effect on eating and swallowing are discussed.

Chapter Ten is a new chapter for the *Fourth Edition*. In this chapter, we explore the feeding and swallowing treatment options for infants and children. Although swallowing safely is the underlying concern for all children, there are specific issues regarding feeding that must be taken into account depending on the underlying diagnosis. Children with birth disorders, genetic disorders, and developmental disorders require special attention in order to facilitate proper growth and nutrition needs. Various neonate and child syndromes and disorders will be presented with the focus on specific needs related to swallowing and feeding.

Chapter Eleven provides a description of the most common surgical procedures for treating swallowing disorders that are not amenable to direct or indirect nonsurgical treatment. As with previous chapters, modifications to the surgical literature required revision of this chapter to identify new surgical techniques that focus on preventing aspiration and improving vocal fold closure. This chapter offers the clinician an understanding of the surgical procedures used to manage aspiration from conservative vocal fold medialization techniques to extensive procedures such as laryngotracheal separation. Although the surgical procedures are briefly described, the importance of decision making by the dysphagia team in planning surgery is emphasized. This chapter combines the surgical procedures with the prosthetic management of swallowing disorders.

Following removal of essential swallowing organs, the need for a multispecialty team to manage structural rehabilitation has become increasingly important. Dysphagia clinicians are now routinely recruited to work with an oral prosthodontist to ensure maximum swallowing and communication functions are restored. This includes the understanding of oral prosthodontics as well as other biomechanical and adaptive devices to aid the patient to swallow safely.

Chapter Twelve presents our philosophical approach to the organization of a multidisciplinary swallowing center with examples of how the multidiscipline team works in the swallowing center. The center combines clinicians trained to manage swallowing and voice disorders in one center since the diagnosis and treatment may involve treating both issues concurrently. Cases are presented to show the value of a comprehensive swallowing that includes voice specialists as well. The contributions of the speech-language pathologist and otolaryngologist in the diagnosis and treatment phases are described.

The concept of a unified center implies efficiency, comprehensiveness, and timeliness in the clinical management process of patients who will benefit from a combined management approach.

A **glossary** is included to help the beginning swallowing therapist quickly find important terms. The glossary in the *Fourth Edition* has been completely revised and includes explanations of the terms as they relate to swallowing and other disease conditions.

This text evolved from our clinical and research interests to improve the treatment of swallowing disorders and from our daily involvement in treating those disorders emanating from a variety of medical conditions, diseases, and disorders. We have translated our clinical experiences into a series of chapters that contain information that we draw upon daily. The *Clinical Management of Swallowing Disorders, Fourth Edition*, offers the student and the practicing clinician a textbook of the current procedures for the management of pediatric and adult swallowing disorders.

Acknowledgments

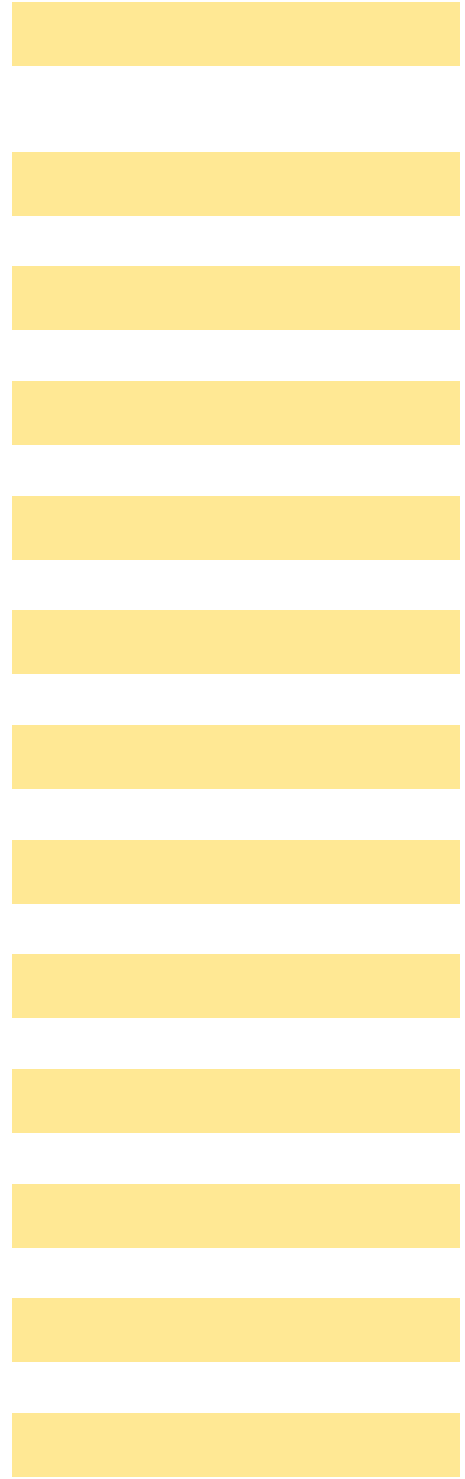
The authors acknowledge the contributions by colleagues in the various disciplines who diagnose and treat swallowing disorders. We have maintained a multidiscipline approach to the treatment of dysphagia over our careers and, through the references in this edition, we acknowledge all of those individuals who manage swallowing disorders in a multidisciplinary format.

The authors are deeply indebted to Marie-Pierre Murry for her work in reviewing the final version of the text, for preparing the glossary which includes extended details as they relate to both swallowing and the underlying disease process and for her unending encouragement while completing the fourth edition.

The authors acknowledge the dedication of Kalie Koscielak and Linda Shapiro, Plural Publishing Inc., who patiently attended to the details of the figures, video legends, and table headings. They worked early and late to bring this version together.

Heartfelt thanks to the Chan's and Ko's family for their professional support and encouragement throughout the preparation of the *Fourth Edition*. Special thanks to Tina Cheung from the Swallowing Research Laboratory, Division of Speech and Hearing Sciences, the University of Hong Kong for her editorial work and table revisions.

We also acknowledge Ivy Cheng, Dai Pu and Kelly Ho, graduate students at the Swallowing Research Laboratory, Division of Speech and Hearing Sciences, the University of Hong Kong, and to Dr. Brianna Crawley and Dr. Rebecca Howell for specific video selections.



Video List

Chapter 1

Video 1–1. Normal flexible endoscopic evaluation of swallowing (FEES).

Video 1–2. Normal modified barium swallow examination (MBS also known as videofluoroscopic examination of swallowing [VFSS]).

Video 1–3. FEES examination of a patient with a history of dysphagia.

Video 1–4. MBS showing a trace of the barium flowing down into the airway after the majority of the bolus is swallowed.

Chapter 2

Video 2–1. Patient with difficulty initiating the proper sequence and thus resulting in significant pooling of the bolus.

Video 2–2. VFSS exam of a patient following CVA.

Chapter 3

Video 3–1. Penetration obtained during transnasal flexible endoscopy.

Video 3–2. Aspiration and cough.

Video 3–3. FEES with aspiration and no cough and the bolus at the level of the larynx.

Video 3–4. VFSS with silent aspiration.

Video 3–5. CVA, right vocal fold paralysis, poor cough, and poor laryngeal elevation.

Video 3–6. Patient with mid-stage Parkinson's disease working to achieve a swallow.

Video 3–7. Effects of inflammation and mucositis several years after XRT.

Chapter 4

Video 4–1. Videofluoroscopic study with the residue of food in the mouth after each swallow.

Video 4–2. Patient with partial glossectomy attempting to swallow with the bolus in the front of his mouth.

Chapter 6

Video 6–1. FESST exam. In this exam the endoscope is seen delivering a pulse of air to the aryepiglottic fold prior to delivering food to the patient.

Video 6–2. FEES video of an individual who had penetration on both liquid and solid materials but produced a cough to clear the penetrated boluses.

Video 6–3. Sample of MBS taken at the lateral position of an individual who had delayed swallow reflex.

Video 6–4. MBS of a 74-year-old man who was 6 years post stroke and had pharyngeal residue after swallow.

Video 6–5. MBS of a 66-year-old man who was 2 years post stroke and had reduced laryngeal elevation and trace aspiration of thin liquid.

Video 6–6. MBS of a 68-year-old man who was 4 years post stroke and had silent aspiration.

Chapter 7

Video 7–1. Patient swallows a liquid bolus and also a cracker.

Video 7–2. Shaker exercise.

Chapter 9

Video 9–1. Child who presented with a behavioral problem related to feeding. Note the movement in the larynx.

Chapter 12

Video 12–1. Patient with Parkinson's disease reporting the feeling of food remaining in his throat.

Video 12–2. Patient with Parkinson's disease who is being treated with breathing exercises using a breath trainer.

Video 12–3. Exam with the lesion on the right vocal fold.

Video 12–4. Patient following radiation therapy for an oral pharyngeal cancer.

Video 12–5. Young child with autism spectrum disorder with excessive residue.

Chapter

1

Introduction to and Epidemiology of Swallowing Disorders

CHAPTER OUTLINE

Introduction

Normal Swallowing

Abnormal Swallowing

Impact of Swallowing Disorders on Quality of Life

Other Impacts of Swallowing Disorders on Quality of Life

Need for Early Intervention

Quality of Life

Epidemiology

Cerebrovascular Accidents (CVAs) and Neurological Diseases

Dementia

Elderly Population

Head and Neck Oncology

Hospitalized Residents

Nursing Home Patients

Cardiac-Related Conditions

Gastroesophageal Reflux and

Laryngopharyngeal Reflux

Other Conditions

Burns

Summary

Discussion Questions

Study Questions

References

A Look at the Chapter

In this chapter, normal and disordered swallowing are defined with video examples. Terminology is reviewed as it relates to normal and abnormal swallowing. The impact of a swallowing disorder on quality of life is presented with examples with a look toward tools for assessing quality of life. Those tools are more specifically reviewed in Chapter 5. We also introduce self-assessment as a tool for studying dysphagia. This is followed by the epidemiology of swallowing disorders. Epidemiology refers to both prevalence and cause of a disorder. In this chapter, we focus on prevalence. Causes will be taken up in later chapters.

INTRODUCTION

Normal Swallowing

The normal swallow is a rapid and overlapping sequence of neurologically controlled movements involving the muscles of the oral cavity, pharynx, larynx, esophagus, and stomach. Although most individuals take normal swallowing for granted, everyone experiences an abnormal swallow at some time in life, most likely resulting in an episode of a sudden choking sensation. However, in a normal, healthy person, this is usually resolved quickly by a cough or throat clearing.

When the muscles of the swallowing organs or the nerves that govern these organs are disordered, disrupted, damaged, or destroyed, swallowing can no longer be normal. However, because of the neuroplasticity of the swallowing organs and their ability to develop compensatory strategies, individuals with neurological or muscular damage to the swallowing organs can still swallow certain types of foods and liquids safely. Video 1-1 is an example of a normal flexible endoscopic evaluation of swallowing (FEES). Video 1-2 is an example of a normal **modified barium swallow** examination (MBS also known as videofluoroscopic swallow study [VFSS]).

Note the fluid movement and the speed of the bolus as it travels to the esophagus.

Abnormal Swallowing

Abnormal swallowing includes difficulty with swallowing or the total inability to swallow, referred to as dysphagia and aphagia, respectively.

*The global definition of **dysphagia** is simply “difficulty in swallowing.”*

When someone cannot swallow at all, the term **aphagia**, or “inability to swallow anything,” is used. The terms dysphagia and aphagia refer to swallowing saliva, liquids, foods, and medications of all consistencies. Dysphagia may also include such problems as foods or liquids “sticking” in the throat or regurgitation of swallowed liquids or foods. Swallowing difficulties may arise from mechanical problems of the swallowing mechanism, neurological disorders, gastrointestinal disorders, or loss of organs due to surgery or traumatic injury. Dysphagia and aphagia may also involve the disruption of the timing of the events needed to swallow normally.

Video 1-3 is a FEES examination of a patient with a history of dysphagia. Note that the food colored green remains in the area above the vocal folds and is not swallowed. It may ultimately be aspirated if the patient does not cough it out. Video 1-4 is an example of an MBS showing a trace of the barium flowing down into the airway after the majority of the bolus is swallowed. In a patient with a weak cough or pulmonary disease, this can lead to aspiration pneumonia.

Impact of Swallowing Disorders on Quality of Life

It is estimated that in the United States alone, 300,000 to 600,000 people with clinically significant dysphagia are diagnosed annually.^{1,2} Nearly 70% of these patients are older than 60 years of age.² The true incidence of dysphagia may not be known, as it is often a condition following a primary diagnosis.



Since dysphagia is a *symptom*, it is often not listed as the principal diagnosis if the physician has only documented the underlying cause. However, according to the *International Classification of Diseases, Tenth Revision* (ICD-10), the appropriate code for dysphagia can be listed as a secondary diagnosis following stroke, esophagitis, and other diseases of the neurological system or gastroesophageal pathway.³

Swallowing disorders, even when subtle, eventually take a toll on quality of life. Because eating is a natural part of social interaction, daily nutrition, and general health, the importance of normal swallowing cannot be overstated. Swallowing affects quality of life in a number of ways, regardless of the severity of the problem. Table 1–1 summarizes common effects that dysphagia has on the quality of life.

Aspiration

Aspiration is a condition in which foods, liquids, pills, or oropharyngeal secretions pass into the air-

way below the level of the true vocal folds. This happens occasionally to most people; but in the absence of injuries to the muscles or nerves of swallowing, most people have the ability to sense the food or liquid in the airway and cough it out. When there is an injury or damage to the swallowing mechanism and aspiration is frequent or extensive, there is a higher risk of lung infections, dehydration, and malnutrition, and the enjoyment of eating diminishes; thus, quality of life also diminishes.^{4,5}

Dehydration

Dehydration is the state when there is not enough water in the body to maintain a healthy level of fluids in the body's tissues. Even in an otherwise healthy person, lack of adequate water intake can lead to dehydration. Water is an essential element for all individuals as it replaces fluid losses from bowel movements, urination, and also from general physical exercise. A general rule of thumb is to

TABLE 1–1. Effects of Dysphagia on Quality of Life

A. Functional Limitations
<ol style="list-style-type: none"> 1. Limitations on the types of food that a patient can swallow safely 2. Patients may be limited to a specific diet of foods that they do not like 3. Time required to swallow and finish a meal may be longer 4. Oral structures may limit the types of food to swallow 5. Some foods may cause the patient to choke 6. Awareness due either to visual or conscious limitations restrict eating 7. Gastric structures or functions may limit amount or type of foods
B. Activities and Participation
<ol style="list-style-type: none"> 1. Patients on a nonoral diet may be reluctant to attend events where food is served 2. Foods related to cultural or religion may not be available to patient 3. Ability to hold and use straw or utensils may limit eating/drinking 4. Ability to eat in a group setting may limit activities 5. Ability to prepare meals may reduce food intake
C. Environmental Factors
<ol style="list-style-type: none"> 1. Changes in room lighting or sound may limit eating 2. Proper eating arrangements may be limited due to room spaces 3. Eating in public may present unwanted attention 4. Use of personal care providers may be needed during mealtimes 5. Ability to prepare food may be limited

replace body fluids with 3 quarts of water per day. For patients with neurological impairments who may be at risk for aspiration when swallowing liquids, fluid intake may require constant monitoring. Other factors such as medications that have dehydrating side effects, as discussed in Chapter 3, may impact one's ability to swallow. For example, when there is not enough natural saliva in the mouth, chewing becomes more difficult, food does not easily form a bolus, and particles may break apart and require multiple swallows. Payne et al reported that dysphagia patients are at high risk for dehydration, which represents a common cause of morbidity and rehospitalization in this group.⁶ Patients with dysphagia should be evaluated frequently for signs of dehydration and, if present, further evaluation of other nutritional deficiencies may be warranted.

Malnutrition

Malnutrition is the condition that occurs when your body does not get enough nutrients due to the inability to ingest food safely, the reluctance to eat or fear of eating/drinking due to past swallowing problems, or the inability to digest or absorb ingested nutrients. Once a person is unable to ingest food safely, his or her ability to maintain health decreases. This is especially important for patients who are recovering from extensive surgeries, strokes, or other debilitating diseases and will require extensive rehabilitation. Once malnutrition develops, its treatment may be as important as any other part of the rehabilitation process. Recovery from malnutrition has been shown to help in the rehabilitation process, including in the treatment of dysphagia, leading to improvement in the patient's quality of life. The specifics of nutrition are reviewed in Chapter 8.

Weight Loss

There is a great preoccupation with weight loss in our society. Extensive weight loss either induced or without reason, requires attention from the dysphagia team. Significant weight loss is associated with the loss of muscle mass, which may produce weakness severe enough to change the daily activities of an individual. Moreover, weight loss may

affect coordination of muscles especially in repeated activities such as swallowing. Weight loss associated with starvation, whether intentional or not, may lead to damage of other vital organs, namely the heart. When unplanned weight loss develops, a swallowing disorder should be suspected. Weight loss should not be so extensive that it affects quality of life nor should it continue beyond normal weight ranges.

The impact of weight loss on various medical conditions or postsurgical recovery has been shown to slow or delay recovery.

A recent survey of studies related to weight loss suggests the importance of monitoring food and liquid intake.⁷ The factors most consistently associated with weight loss were depression, poor oral intake, swallowing issues, and eating/chewing dependency. Staffing factors were associated with weight loss in most studies.

The factors most consistently associated with a low body mass index (BMI) included immobility, poor oral intake, chewing problems, dysphagia, female gender, and older age. The factors most consistently associated with poor nutrition included impaired function, dementia, swallowing/chewing difficulties, poor oral intake, and older age.

Temporary nonoral feeding arrangements are now more commonly used to stabilize weight during recovery from severe diseases and disorders and to speed up such recovery.^{8,10}

Types of Pneumonia

Not all pneumonia is the result of dysphagia or aphagia. Infections, poor health, and lack of proper posthospital care may lead to other types of pneumonia. Clinicians who treat swallowing disorders must be aware of these, as aspiration may play a part in their cause.

Aspiration Pneumonia. When pulmonary infection results from acute or chronic aspiration of fluids, foods, or oral secretions from the mouth or from fluids arising in the stomach and flowing into the airway, **aspiration pneumonia** develops. This is a potentially life-threatening condition and requires significant medical attention. However, not all aspiration leads to pneumonia. Studies report that 28% to 36% of asymptomatic healthy older adults demonstrate trace aspiration on a FEES and up to 45% of normal adults demonstrate aspiration of oropharyngeal secretions during sleep.⁴ Nonetheless, aspiration pneumonia creates significant morbidity and may account for up to 70% of community-acquired pneumonia in elderly patients.¹¹

Nosocomial Pneumonia. **Nosocomial pneumonia**, also called hospital-acquired pneumonia, is usually the result of bacterial infections acquired during the first 48 to 72 hours following admission to a hospital. Nosocomial pneumonia is often the cause of death following admission to an intensive care unit. Factors such as old age, aspiration of saliva, fever, and gastric contents rising and falling into the airway (gastric reflux) are common causes of nosocomial pneumonia.

Community-Acquired Pneumonia. **Community-acquired pneumonia (CAP)** is an infection of the lungs in people who have not been hospitalized. It is a disease that can affect people of all ages and is often the leading cause of death in countries where vaccination against diseases has not been established.

In CAP, the patient may appear to be swallowing normally but, due to fever or breathing difficulty, the lungs slowly absorb fluids, resulting in infection.

CAP is treated with antibiotics and may require rehospitalization. In undeveloped countries, CAP can occur in patients who have recently been hospitalized and discharged without proper follow-up.¹¹

Other Impacts of Swallowing Disorders on Quality of Life

General Health

The inability to swallow correctly may lead to a decline in general health. This may be slow or rapid and is usually, but not always, associated with other diseases. For individuals with systemic diseases such as **Parkinson's disease**, diabetes mellitus, or high blood pressure, dysphagia may decline slowly. For disorders such as gastroesophageal reflux and autoimmune disorders, dysphagia may initially be sporadic and will increase as the severity of the primary problem increases.¹² With the onset of dysphagia, the body is not able to cope as well with the primary disease. Moreover, the primary disease may be exacerbated by the dysphagia.

Psychological Well-Being

Eating is a social function as well as a nutritional necessity. When an illness or disease is further compounded by dysphagia, the natural social functions in which food plays a role are limited.¹³ The person with a swallowing disorder can no longer participate seamlessly in the social interactions that surround meals. He or she is no longer able to eat in his or her normal location (home, for example) or with the same individuals that he or she has dined in the past. The meal is now in a clinical setting or in a setting with a caregiver following a prescribed diet that may include foods that are new to the individual and not part of his or her lifelong diet. In controlled settings such as a hospital or nursing home, the diet to adhere to is one that will allow the patient to regain health rather than a diet whose primary purpose is enjoyment.

Financial Well-Being

The financial impact caused by dysphagia can be significant if there is a need for special foods, supplemental feeding, primary **enteral** or **parenteral nutrition**, dysphagia therapy, special gadgets and appliances to aid in the preparation of meals, or the need for others to assist with feeding. Some or

all of these expenses may be paid for by insurance; however, the costs of all dysphagia-related management issues may be substantial and may continue for extended periods of time, straining the financial condition of the patient, his or her family, and the economic welfare of the patient. Limitations brought by insurance capitation or personal financial abilities often compromise ideal rehabilitation strategies.

The true financial impact of dysphagia remains unknown, as research has not yet determined the total cost of major events such as aspiration pneumonia and hospital readmissions or the cost-benefit ratio for the early identification and management of swallowing disorders. Conventional wisdom suggests that early intervention may prevent extensive comorbidities that result from the interaction of swallowing disorders with other diseases or disorders; clinical research ultimately will lead to the confirmation of methods of dysphagia rehabilitation.

NEED FOR EARLY INTERVENTION

“Not everything that counts can be counted.”

Dennis Burket, as quoted in Kitchen Table Wisdom by R. N. Remen¹⁴

Quality of Life

There is only limited, albeit strong and intuitively correct, evidence that the diagnosis and treatment of dysphagia are efficacious from the standpoint of significantly reducing aspiration pneumonia. Most of the evidence that exists is based on studies of stroke patients, although, as pointed out in later in Chapters 5, 7, and 8, there also is evidence derived from research on patients undergoing treatment for cancers of the head and neck. The limited evidence suggests that, in the acute care setting, dysphagia management is accompanied by reduced pneumonia rates. Furthermore, the use of a complete **clinical**

swallow evaluation (CSE) appears to be cost effective.¹ Others have found dysphagia management to be useful in the rehabilitation of swallowing disorders in other populations. Wasserman et al¹⁵ have shown that, regardless of the underlying diagnosis, accurate reporting of the clinical swallow evaluation information and an early aggressive treatment program are efficacious in reducing the length of hospital stays in patients undergoing major surgery for head and neck cancer. Additionally, development of valid screening procedures, such as the scale created by Foster and colleagues¹⁶ may offer further basis for early treatment of patients with dysphagia. They administered a screening instrument for dysphagia to 299 inpatients and found that the scale provided a means for targeting patients for early swallowing assessment and intervention.

McHorney and colleagues^{17,18} presented early versions of 2 quality-of-life assessments to determine the need and value of treating swallowing disorders. The SWAL-QOL is a validated, 44-item tool and described in detail in Chapter 5. The SWAL-CARE is a 15-item tool that assesses quality of care and patient satisfaction and is also described in Chapter 5. The SWAL-QOL and SWAL-CARE may help clinicians to focus on the patient's treatment and determine treatment effectiveness. The work of McHorney¹⁸ found that the SWAL-QOL and SWAL-CARE were related primarily to oral transit duration and total swallow duration.

In general, the lack of control groups, the undefined effects of diseases, and the lack of long-term follow-up data limit the statements that can be made about the true effects of early dysphagia intervention. Nonetheless, the clinical evidence gathered by those treating patients with dysphagia on a day-to-day basis suggests that intervention improves quality of life. The lack of prospective, controlled, randomized research should not suggest that swallowing programs using the CSE or other programs such as the MBS (see Chapter 6) or the FEES (see Chapter 6) should not be continued. On the contrary, studies such as that by Odderson et al¹⁹ and Mahler et al²⁰ provide strong arguments for continued early intervention in dysphagia. Early on, Odderson et al looked at pneumonia rates before and after initiating a CSE program in a hospital setting.

Aspiration pneumonia rates in stroke patients were substantially reduced after an early intervention swallowing program was initiated compared to pneumonia rates before the program was started.

Mahler and colleagues²⁰ studied Parkinson's disease and found that a program focusing on strengthening laryngeal closure and cough showed prolonged positive effects on speech and swallowing. Additional research is needed to provide further evidence for programs that focus on dysphagia intervention to include a data acquisition format that offers an opportunity to assess their contribution to reduction of aspiration pneumonia, length of hospital stays, and readmissions to hospitals due to swallowing-related problems.

EPIDEMIOLOGY

Dysphagia can be caused by many different disorders, including natural aging, neurological diseases, head injury, degenerative diseases, systemic diseases, autoimmune disorders, neoplasms, and infections. Treatment modalities such as surgery, radiation therapy, and medications can also lead to dysphagia. Chronic reflux laryngitis, often overlooked, may also interfere with normal swallowing. Patients with head or neck cancer have a variable presentation. They often have significant dysphagia at the time of initial presentation, and their swallowing function also often suffers as a result of treatment, although some deficits improve with time. Patients with Parkinson's disease suffer from dysphagia that becomes more severe as the disease progresses. Because of these varied and often compounded etiologies, it may not be possible to ascertain the true incidence of any particular category of disorder. In addition to these factors, there is no single test that is 100% accurate for diagnosing dysphagia or its primary cause.

Swallowing disorders may arise as comorbidities of other disorders or as precursors to more significant diseases and disorders. Moreover, the incidence of swallowing disorders may vary depending on the type of diagnostic evaluation. Table 1–2 shows the

incidence of oropharyngeal dysphagia in patients who exhibited aspiration during videofluoroscopic and flexible endoscopic examinations.^{3,21,22}

The incidence of swallowing disorders following a stroke remains high; however, with the advent of improved assessment techniques, the treatment process following evidence of aspiration is now better understood. If all of the tests for examination of swallowing are considered, the true incidence of swallowing disorders may be substantially higher. When the swallowing disorder accompanies other medical conditions, the primary condition may be affected by the swallowing disorder. Conversely, a swallowing disorder may be the symptom of another neurological disease or condition requiring

TABLE 1–2. Incidence of Oropharyngeal Dysphagia in Patients Who Exhibited Aspiration During Videofluoroscopic Examination and Flexible Endoscopic Evaluation of Swallowing^a

Cause of Dysphagia	Number (%) of Patients
Head and neck oncologic surgery	59 (36)
Cerebrovascular accident	47 (29)
Cardiac-related event ^b	294 (22)
Closed head injury	12 (7)
Spinal cord injury	10 (6)
Degenerative neurologic disease ^c	9 (6)
Adductor vocal fold paralysis	7 (4)
Zenker diverticulum	4 (2)
Generalized weakness	5 (3)
Cerebral palsy	3 (2)
Central nervous system involvement from AIDS	Unknown
Craniotomy (for aneurysm repair)	2 (1)
Undetermined	4 (2)

^aAdapted and modified from Rasley et al.²¹

^bData derived from Aviv et al.²²

^cIncludes Parkinson disease, motor neuron disease, and multiple sclerosis.

treatment. Thus, the exact incidence of swallowing disorders remains unknown.

Cerebrovascular Accidents (CVAs) and Neurological Diseases

Stroke is the third leading cause of death in the United States. Approximately 500,000 new cases are reported yearly and 150,000 individuals die of CVAs every year. Prospective studies have demonstrated an incidence of dysphagia as high as 41.7% in the first month after a CVA. The overall rate of aspiration resulting from a CVA is approximately 33.3%. One-half of these patients will aspirate silently (with no obvious clinical symptoms or signs). As many as 20% die of aspiration pneumonia in the first year after a CVA, and 10% to 15% will die of aspiration pneumonia after the first year following the stroke. In general, the larger the area of ischemia, the more significant is the swallowing disorder. Although the site of lesion does not always correlate with the type and severity of the swallowing disorder, brainstem strokes produce dysphagia more frequently than cortical strokes. Table 1–3 shows the epidemiological data compiled from the Agency for Healthcare Policy and Research and Quality (AHRQ) for neurological diseases including stroke.¹

Specific information concerning stroke suggests that a left cerebral infarction increases the risk of aspiration pneumonia compared to a right-side CVA.²³ A recent study by Flowers et al looked at the co-occurrence of dysphagia, dysarthria, and aphasia. They found estimates of the incidence of dysphagia, dysarthria, and aphasia were 44%, 42%, and 30%, respectively.²⁴ The highest co-occurrence of any two impairments was 28% for the presence of both dysphagia and dysarthria. Ten percent of all the 221 patients studied had all 3 impairments. The highest predictors were nonalert level of consciousness for dysphagia, symptoms of weakness for dysarthria, and right-sided symptoms for aphasia.

Dementia

Dementia refers to the inability to carry out tasks due to the loss of brain function. The loss of func-

tions depends on the part of the brain that is damaged. Dysphagia is common in elderly patients with **dementia**. According to videofluoroscopic reports, normal swallowing function is found in only 7% of patients with dementia. This group of patients is the most difficult to assess with any type of functional study, due to their dementia. The effectiveness of therapeutic maneuvers that require patient cooperation is also low. Nonoral nutrition alternatives must be considered in patients with dementia and dysphagia. Recurrences of aspiration pneumonia, continued weight loss, and/or refusal to eat are the key indications for implementing nonoral nutrition alternatives.

Elderly Population

Seventy to 90% of elderly patients, even those without known neurological disease, have some degree of swallowing dysfunction, if not true dysphagia. Objective functional tests are necessary to rule out specific diseases and to assess the risk of aspiration. As many as 50% of elderly patients have difficulty eating, leading to nutritional deficiencies with associated weight loss, increased risk of falling, poor healing, and increased susceptibility to other illnesses. Weight loss, increased length of meals, depression, and general complaints of fatigue are often observed in this group prior to the diagnosis of a swallowing disorder.

Head and Neck Oncology

The presence of a tumor in the upper aerodigestive tract may affect swallowing by

1. Mechanical obstruction due to bulk or extraluminal compression
2. Decreased pliability of the soft tissue due to neoplastic infiltration
3. Direct invasion leading to paralysis of important pharyngeal or laryngeal muscles
4. Loss of sensation (taste, feel) caused by nerve injury
5. Pain

TABLE 1–3. Epidemiological Data From the Published Literature: Neurological Diseases and the Rate of Dysphagia Within Each

Disease	Prevalence (per 100 000)	Incidence (per 100 000)	Study	Reason	Diagnosed Occurrence of Dysphagia (%)	Study	Reason
Stroke	NA	145	Brown et al. (25)	Mayo Clinic	VFSS: 74.6	Daniels et al. (35)	Median of VFSS studies
		289	Modan and Wagener (26)	Mayo Clinic seemed low: this provides an upper estimate	CSE: 41.7	DePippo et al. (36)	Median of CSE studies ^a
Parkinson disease	106.9	13	Mayeux et al. (27)	Only number on general population that included elderly	VFSS: 69.1	Bushmann et al. (37); Fuh et al. (38)	Mean of 2 studies in which L-dopa was withheld
Alzheimer disease	259.8	NR	Beard et al. (28)	Only published number	VFSS: 84	Horner et al. (39)	Only published number
Multiple sclerosis	170.8	NR	Wynn et al. (29)	Only number; Mayo Clinic	NR	NA	NA
Motor neuron disease	170.8	6.2	Lilienfeld et al. (30)	Only published number	51.2 (method not reported)	Leighton et al. (40)	Exam, not survey
Amyotrophic lateral sclerosis	NR	1.8	McGuire et al. (31)	Exam, not survey	29 (method not reported)	Litvan et al. (41)	Only published number
Progressive supranuclear palsy	1.39	1.1	Golbe et al. (32); Bower et al. (33)	Only published number	VFSS: 55.6	Kagel, Leopold (42)	Only published number
Huntington disease	1.9	0.2	Kokmen et al. (34)	Only published number	VFSS: 100		

Abbreviations: CSE, bedside swallowing evaluation; NA, not applicable; NR, not reported; VFSS, videofluoroscopic swallowing study (also known as the modified barium swallow [MBS]).

^aNow referred to in this text as the clinical swallow evaluation (CSE).

6. Factors related to desire for eating (appetite and craving)

Treatments for squamous cell carcinoma, namely, surgery, radiation, or chemotherapy, produce dis-

abilities that are usually proportional to the volume of the resection and/or the radiation field. Surgery produces division and fibrosis of muscles and anesthetic areas due to the transection or extirpation of afferent neural fibers and/or receptors.

Radiation therapy leads to xerostomia (dryness of the mouth), which, in many cases, is permanent and a main source of swallowing complaints made by patients.

Irradiation also produces fibrosis of the oropharyngeal and laryngeal musculature. Chemotherapy may lead to weakness, nausea, or reduced sensory processes and may add to immediate radiation side effects such as mucositis, the thickening of mucus in the mouth, pharynx, and esophagus. Although newer types of radiation treatment known as **intensity modulated radiation therapy** (IMRT) have been used recently and are described more fully in Chapter 3, the results still impact swallowing both in the short term and long term.

Swallowing function after radiation treatment appears to be related to both site and stage of disease. In general, patients with so-called anterior tumors, such as on the floor of the mouth or anterior oral tongue, have better posttreatment outcomes regarding swallowing than do patients with posterior tumors, such as on the oropharynx or hypopharynx. Reconstructive methods also influence the swallowing outcome. Patients who are reconstructed with primary closure have fewer problems swallowing than patients who are reconstructed with bulky insensate flaps.

Hospitalized Patients

The incidence of swallowing disorders in patients admitted to critical care units is increased by the need for endotracheal and nasogastric intubation and tracheotomy, the use of sedatives, impaired consciousness, and the debilitated status of many of the patients requiring critical care.

Acute care patients should be assessed for swallowing disorders within the first 24 hours of hospitalization. In many hospitals, a standing order exists for a CSE of the acute patient within 24 hours of admission. Patients requiring mechanical ventilation are at higher risk for aspiration pneumonia. The mortality of nosocomial pneumonia is estimated

to be 20% to 50% for hospitalized patients. Hospital costs due to nosocomial infection may exceed \$22,000 per occurrence.

Nursing Home Residents

Studies carried out in nursing homes have demonstrated that 40% to 60% of the residents have clinical evidence of dysphagia. This number appears to be increasing in recent years. Smith et al⁴³ suggest that the high number of nursing home residents with dysphagia is due, at least in part, to discharging patients with swallowing disorders from acute care settings into institutional care.

The prevalence of all types of pneumonia has been estimated to be 2%, although it is unknown how many of these patients developed pneumonia as a result of aspiration. The death rate for patients diagnosed with pneumonia in a nursing home and admitted to acute care centers may exceed 40% of all readmissions.

Cardiac-Related Conditions

The number of patients seen in major medical centers for cardiac-related conditions is always increasing, due to the life-sustaining procedures available in emergency settings and the types of surgical treatment available to patients following cardiac events. In 2004, a large cohort of patients (1340) with swallowing disorders was examined by Aviv and colleagues⁴⁴ in an effort to identify safety and comfort factors related to assessment of swallowing disorders using the flexible endoscopic examination of swallowing with sensory testing (FEESST) procedure in inpatients and outpatients. The largest patient subgroup, as might be expected, included poststroke patients; however, surprisingly, the second-largest group included patients with cardiac-related events (22.2%). The majority of cardiac-related cases in the acute, inpatient setting had undergone open heart surgery (almost 60% of cases), followed by patients who had had heart attacks and those with congestive heart failure and newly diagnosed arrhythmias. The authors found that a large percentage of these

patients had significant vagal nerve sensory dysfunctions when tested with FEESST and thus were at risk for **silent aspiration**—that is, aspiration without sensing the need to cough.

Gastroesophageal Reflux and Laryngopharyngeal Reflux

Over the past 15 to 20 years, reflux disease has been shown to be a common cause of swallowing disorders. Belafsky reported that the most common cause of dysphagia complaints was related to reflux disease.⁴⁵ Gastroesophageal and laryngopharyngeal reflux are discussed in detail in Chapter 3. In short, acid from the stomach rises into the esophagus and often to the level of the larynx creating a burning in the chest or a feeling of a lump in the throat leading to a delayed or disrupted normal swallow.

Other Conditions

Patients may present to an outpatient facility with numerous problems that include difficulty with swallowing or the inability to swallow. Other swallowing disorders may also be identified when a patient is hospitalized for the care of other conditions. Table 1–4 outlines the most common conditions that may indicate a swallowing disorder is also present. The true incidence of swallowing disorders in patients presenting with these problems is unknown.

In infants and young children, swallowing problems are often overlooked until a nutritional or failure to thrive condition exists. Infant and childhood dysphagia have evolved into a separate area of study thanks to increased neonatal care, better instrumentation to study the problem, and findings of the importance of nutrition to improve other coexisting problems in young children. The main causes of sucking, swallowing, and feeding disorders are lesions of the brainstem such as malformations of the posterior fossa, neonatal brainstem tumors, agenesis of cranial nerves, lesions of the posterior brain, craniovertebral anomalies and syndromes that involve rhombencephalic development such as Pierre Robin sequence, CHARGE syndrome, and so on.

TABLE 1–4. Conditions That May Lead to or Are Directly Related to Swallowing Disorders

Type of Condition	Common Examples
Congenital	Dysphagia lusoria Tracheoesophageal fistula Laryngeal clefts Other foregut abnormalities
Inflammatory	Gastroesophageal reflux disease (GERD) Laryngopharyngeal reflux (LPR)
Infections	Lyme disease Neuropathies/encephalitis Chagas disease HIV
Trauma	Central nervous system trauma Upper aerodigestive tract Blunt traumatic injuries to the oral, laryngeal, and/or esophageal organs Burns
Endocrine	Goiter Hypothyroid Diabetic neuropathy
Neoplasia	Oral cavity and contents Upper aerodigestive tract Thyroid Central nervous system
Systemic	Autoimmune disorders Dermatomyositis Scleroderma Sjögren disease Amyloidosis Sarcoidosis
Iatrogenic	Surgery Chemotherapy Other medications Radiation

Suprabulbar lesions, neuromuscular disorders, peripheral esophageal, digestive, and laryngeal anomalies and dysfunctions can also be involved.⁴⁶

The main principles of the management of congenital sucking, swallowing, and feeding disorders are discussed in Chapters 9 and 10.

Burns

The true incidence of swallowing disorders caused by burns is not well documented. Although burns may occur in the oral cavity, pharynx, or esophagus, unless the burns are extreme in the oral cavity and pharynx, they usually resolve with no significant swallowing disorder. However, burns in the esophagus may lead to esophageal strictures.⁴⁷ Examination of the esophagus with endoscopy and ultrasound has improved the morbidity associated with esophageal burn disorders; nonetheless, patients often need recurring dilation and possibly esophageal stents to maintain nutrition. Late reconstructive surgery, mainly using colon transposition, offers the best results in referral centers, either in children or adults, but such a difficult surgical procedure is often unavailable in developing countries.⁴⁸ Continuous long-term monitoring is important as strictures may re-form and esophageal cancer may develop, which is rare but possible.

SUMMARY

Swallowing disorders have a significant effect on a patient's quality of life, including the patient's physical, financial, and psychological well-being. These effects are highlighted in this chapter and discussed in depth by Treats within the framework of the World Health Organization's International Classification of Functioning, Disability, and Health.⁴⁹ Dysphagia leads to a number of complicating factors, whether the patient is generally healthy or is recovering from a neurological event, cancer, or other surgery. The inability to swallow leads to weight loss, weakness, and, in severe cases, complicating medical problems.

Although research is somewhat limited, there appears to be a general clinical consensus that early intervention in dysphagia through proper diagnosis

and treatment may reduce the comorbidities and thus shorten the length and cost of the hospital stay.

Treatment of swallowing disorders varies according to the underlying pathophysiology and status of the patient. Outpatients with minor problems are generally cooperative and willing to make adjustments in lifestyle and diet to improve their swallowing disorder. Hospitalized patients may be severely deconditioned or their cognitive status may limit their cooperation in the rehabilitation process. The patient with dysphagia presents a unique opportunity for team diagnosis and treatment. The remainder of this text explores the methods and approaches to treating swallowing disorders.

DISCUSSION QUESTIONS

1. With which groups of patients might the SWAL-QOL and SWAL-CARE be most useful? In what groups might its use be limited?
2. What are some of the significant negative effects of a swallowing disorder on an otherwise healthy person?
3. There is a rising awareness of reflux disease reported among otolaryngologists and speech-language pathologists (SLPs). What evidence exists to suggest the need for SLP involvement?
4. What are the complications that might exist with a patient with dementia when conducting a CSE prior to treatment?
5. Dementia presents unique problems to the clinician treating dysphagia. Why?

STUDY QUESTIONS

1. Aspiration refers to
 - A. Liquid or food caught in the throat
 - B. Liquid or food passing into the airway below the vocal folds
 - C. Coughing after swallowing liquids or foods
 - D. Inability to cough when choking on liquids or foods