

Pediatric Swallowing and Feeding

Assessment and Management

THIRD EDITION

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Foreword

It has been 25 years since the first edition of this landmark publication *Pediatric Swallowing and Feeding: Assessment and Management* was published. The second, updated edition was published in 2002. Now, in 2020, we have the third edition of this fundamental text concerning the understanding and care of pediatric swallowing and feeding. The editors, one of whom unfortunately was deceased before publication, have recognized the advances and changes in the understanding of the information now available for the care of pediatric swallowing and feeding challenges. They have recruited an outstanding group of contributors for this newest edition and there are numerous critically important updates and additions. The editors have included the World Health Organization's *International Classification of Functioning, Disability, and Health* as the functional basis for all areas of the book. This text is important as there are an increased number of children with complex medical and

health care conditions who are at risk for feeding and swallowing disorders. This third edition stresses the need for a team approach and it also documents the use of “virtual” teams. This is evidenced through the chapter contributors who are professionals in their respective fields. Chapter 10 is especially important now as it documents the pulmonary manifestations and considerations concerning aspiration in pediatric patients. Chapter 12 addresses the genetics underlying many of these conditions, which was information that was unavailable in the first two editions.

Pediatric Swallowing and Feeding: Assessment and Management, Third Edition is the fundamental holistic source for all health care professionals who provide care for children with swallowing and feeding problems throughout the world. The previous editions have been, and now this updated third edition continues to be the standard for information concerning diagnosis and care of these children.

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Preface

This third edition of *Pediatric Swallowing and Feeding: Assessment and Management*, now co-edited with Maureen A. Lefton-Greif, PhD, is published at a time when recognition of the complexities of infants and children with swallowing and feeding disorders is increasing. Recent advances in genetics and epigenetics and the neurophysiologic underpinnings of feeding and swallowing development and their disorders have contributed to the appreciation of the complicated inter-relationships among structures, functions, and the environment throughout childhood. This body of information has advanced this field since publication of the first two editions of this book in 1993 and 2002. Consequently, this third edition is long overdue. It includes significant updates and considerable new information, making it a “new” edition rather than a simply revised edition.

We trust that this edition meets the challenges of balancing updates with new information, while adhering to the salient and immutable basic concepts that underlie this area of practice. Notably, breathing and eating are basic to survival. Their disruptions can lead to significant compromises in nutrition and growth, respiratory health, development and academic skills, and overall general health and well-being. With medical advances and the increases in the survival and life expectancy of medically fragile children, more attention has been given to the multidisciplinary needs of these children. Nonetheless, high-quality evidence to support the care of these children

and the development of consensus-driven guidelines have not kept pace with the recognition of the needs of these children. The World Health Organization’s emphasis on “function” and “participation” serve as essential steps in the development of meaningful evaluations and effective interventions, and mandates that professionals set high priorities on interactions between caregivers and children, and the need for non-stressful feedings from preterm infants through teenage years and into adulthood. Focusing on only “oral skills” or “safe swallowing” is not enough.

This edition builds on the first two in which Dr. Linda Brodsky contributed her extraordinary medical knowledge and leadership in many ways. She is missed not only for her role in this book, but for her contributions to research and patient care in pediatric otolaryngology. We have built on her knowledge and passion for children and their families.

We acknowledge the many people who made this edition possible. First, we offer a special thank you to all the authors who shared their extensive knowledge and experience in their specialty areas and for their generous time commitments given their busy clinical and research schedules.

We thank Beth Ansel, PhD, and Jeanne Pinto, MA, for their superb editing, suggestions, and attention to detail. The editors at Plural Publishing have paid attention to the many details necessary to bring this book to publication, and we thank them for their patience and expertise. We are grateful

for the families who gave permission for their children to be photographed adding examples of the real purposes for all of us—enhancing the lives of children with swallowing and feeding disorders.

Most of all we thank all the families and caregivers who have trusted us with the care of their children. We are in awe of

their courage, inspired by their strength, grateful for their contributions to the care of future generations of children with swallowing and feeding disorders, and delight in the joy they have brought to us. Finally, we thank our families, to whom this book is dedicated.

About the Editors



Joan C. Arvedson, PhD, is a speech-language pathologist, with Specialty in Pediatric Feeding and Swallowing Disorders at the Children's Hospital of Wisconsin-Milwaukee and a clinical professor in the Department of Pediatrics, Medical College of Wisconsin. She is recognized internationally for her clinical work in pediatric swallowing and feeding disorders, lecturing/teaching, and scientific publications. The first two editions of this book were published while she was at the Children's Hospital of Buffalo/Kaleida Health in Buffalo, NY. She and Dr. Lefton-Greif co-authored *Pediatric Videofluoroscopic Swallow Studies: A Professional Manual with Caregiver Guidelines*. Dr. Arvedson developed an online course, *Interpretation of videofluoroscopic swallow studies of infants and children: A study guide*

to improve diagnostic skills and treatment planning. She also developed independent study videoconferences for the American Speech-Language-Hearing Association's professional development initiatives. Dr. Arvedson is a founding member of the Board of Certified Specialists in Swallowing and Swallowing Disorders. She is a Fellow of ASHA and was awarded Honors of the Association in 2016. Dr. Arvedson is a member of the editorial board of *Dysphagia*. She is past-president of the New York State Speech-Language-Hearing Association and the Society for Ear, Nose, and Throat Advances in Children.



Linda Brodsky, MD (1952–2014), an internationally recognized pediatric otolaryngologist, was Chief of Pediatric Otolaryngology at the Children’s Hospital of Buffalo/Kaleida Health in Buffalo, New York; Professor at the State University of New York at Buffalo Medical School; Director of the Children Hospital’s Center for Pediatric Otolaryngology and Communication Disorders. Dr. Brodsky was co-editor of the first two editions of *Pediatric Swallowing and Feeding: Assessment and Management* with Dr. Arvedson. In 2014, preliminary discussions were underway for this third edition. She’s authored more than 100 scientific papers and 27 book chapters and served on the editorial boards of several medical journals. She was listed in the *Best Doctors in America* series and *Who’s Who in Science and Engineering*. Dr.

Brodsky was presented with the Sylvan Stool award for excellence in teaching by the Society for Ear, Nose, and Throat Advances in Children. She was a strong advocate for mentorship of young women in medicine. Her devotion to her patients and tenacity in advocating for their care was legendary. Dr. Brodsky is missed by her family, colleagues, and patients.

Maureen A. Lefton-Greif, PhD, is Professor in the Departments of Pediatrics, Otolaryngology—Head and Neck Surgery, and Physical Medicine and Rehabilitation at Johns Hopkins Medical Institutions. She is an internationally recognized speech-language pathologist for her clinical expertise and research on swallowing and its development and disorders in children of all ages. Her work focuses on optimizing pediatric swallowing evaluations to facilitate the prompt initiation of treatment and lessen the consequences associated with dysphagia. Dr. Lefton-Greif is the recipient of grants and support from National Institutes of Health—Deafness and Other Communication Disorders, Ataxia-Telangiectasia Children’s Project, and the Muscular Dystrophy Association. She and Dr. Arvedson co-authored the book, *Pediatric*



Videofluoroscopic Swallowing Studies: A Professional Manual with Caregiver Guidelines. More recently, she and Dr. Bonnie Martin-Harris developed the BaByVFSSImP©. She is a Fellow of ASHA and a founding member and the first vice-president of the Board of Certified Specialists in Swallowing and Swallowing Disorders. Dr. Lefton-Greif serves on the editorial advisory boards of *Dysphagia* and the *Canadian Journal of Speech-Language Pathology*.

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1 Overview of Diagnosis and Treatment

Joan C. Arvedson and Maureen A. Lefton-Greif

Introduction

During the years since the second edition of this book, there has been an exponential increase in basic and clinical research related to swallowing and feeding in infants and children. The complexities of interacting systems continue to present challenges to clinicians and to parents. All involved in the care of children strive to help them to be healthy and to grow appropriately, while ensuring that eating and drinking are pleasurable with no stress to children or their caregivers. Factors that have not changed relate to basic physiologic functions.

Breathing and eating are the most basic physiologic functions defining the beginning of life for newborn infants outside of the womb. Breathing is reflexive, life sustaining, and occurs in response to the transition from the fluid environment of the womb to the postnatal air environment. Eating is partly instinctual and partly a learned response. Eating requires the ingestion of nutrients provided by an outside source. In the newborn infant, sucking and swallowing require a complex series of events and coordination of the neurologic, respiratory, and gastrointestinal (GI) systems. Normal GI function must occur in

digestion of foods to provide nutrients. All of these functions are mediated by the integrity of physical and emotional maturation.

The act of feeding is a dyadic process that requires interaction between the feeder, usually the mother, and the infant. From the beginning, feeding should be parent led with emphasis on quality of feeding, and not on volume, which often results in stressful feedings and a potentially reduced volume of intake and refusals. The pleasure of eating extends beyond the feeling of satiety to the pleasure gained through food ingested by the infant and provided by the mother, who is most often the primary caregiver. This interactive primary relationship is the first for every neonate. It serves as a foundation for normal development, somatic growth, communication skills, and psychosocial well-being. Thus, feeding of the newborn infant, young child, and rapidly growing teen is an activity with far-reaching consequences. When feeding is disrupted, the sequelae can include malnutrition, behavioral abnormalities, and severe distress for family and child alike. Interruption of growth and development sometimes cannot be reversed if it occurs at a critical time during the early months and years of a child's life (Chapter 3). Lifelong disabilities may result.

Prevalence

Currently, more than 100,000 newborn infants are given diagnoses of feeding problems after being discharged from acute care hospitals, and more than one-half million children (3–17 years) in the United States are diagnosed with dysphagia annually (Bhattacharyya, 2015; CDC/NCHS National Hospital Discharge Survey, 2010). The number of children with swallowing and feeding disorders has been increasing in part due to recent medical and technological advances, which have improved the survival of many infants and children who previously would not have survived. The range and complexity of their problems will continue to challenge the health care, educational, and habilitation/rehabilitation systems because many of these children are now living longer, remaining healthier, and having greater expectations for leading full and productive lives.

Approximately 40% of children born preterm have swallowing/feeding disorders. Globally, an estimated 15 million infants are born preterm (less than 37 weeks' gestation), and the number is increasing (World Health Organization [WHO], 2017). Although many children and their families have benefited greatly, the increasing number of children born prematurely at low birth weight (less than 2,500 g), very low birth weight (less than 1,500 g), and extremely low birth weight (less than 600 g) are frequently confronted with multiple complex medical problems. In comparison to full-term infants, late preterm infants (34-0/7 to 36-6/7 weeks gestation) are at increased risk for respiratory and neurologic complications that may produce or exacerbate feeding difficulties (Engle, Tomashek, & Wallman, 2007; Mally, Bailey, & Hendricks-Munoz, 2010). Other

infants with genetic, cardiac, and gastrointestinal abnormalities are faced with complex medical and in some instances surgical problems. Early recognition and intervention have been invaluable despite the cognitive disabilities, cerebral palsy, chronic pulmonary problems, structural deficits, and neurologic impairments that infants endure. Swallowing and feeding problems compound most of these conditions.

Developmental Considerations

After the establishment of adequate respiration and physiologic stability, the highest priority for caregivers is to meet the nutritional needs of their newborn infants. To achieve this goal successfully, infants and children of all ages require a well-functioning oral sensorimotor and swallowing mechanism, overall adequate health (including respiratory, gastrointestinal, and neurologic), appropriate nutrition, central nervous system integration, and adequate musculoskeletal tone.

In addition, the emergence of communication, an often-overlooked process, is closely aligned with successful swallowing and feeding, particularly in young children (Malas, Trudeau, Chagnon, & McFarland, 2015). Normal feeding patterns are reflected in the early developmental pathways that sequentially and rapidly emerge during the first several months and years of life. Communication is one of the most important of those pathways. The interrelationship between feeding, shared by all biologic creatures, and language-based, verbal communication, unique to humans, cannot be overemphasized. The comparative anatomy of the upper aerodigestive tract and its impli-

cation for the development of human communication has been established (e.g., Laitman & Reidenberg, 1993, 2013; LaMantia et al., 2016; Lieberman, McCarthy, Hiimae, & Palmer 2001; Madriples & Laitman, 1987).

Children who are born prematurely with very low birth weight or neurologic impairment are commonly found to have swallowing and feeding problems. Other high-risk children are those experiencing birth trauma, prenatal and perinatal asphyxia, and a multitude of genetic syndromes with accompanying structural and neurologic impairment (Chapters 3 and 12). The presence of cardiac, pulmonary, and GI disease

often creates additional difficulty in sorting out primary and secondary etiologies. Diagnosis and management in these patients present even greater challenges (Table 1–1).

The ability to feed an infant successfully and thereby nurture an infant is imprinted early on the maternal–infant relationship. Normal oral sensorimotor development includes the establishment of (a) stability and mobility of the ingestive system, (b) rhythmicity, (c) sensation, and (d) oral-motor efficiency and economy (Gisel, Birnbaum, & Schwartz, 1998). Optimally, maternal, as well as paternal, and infant bonding begins at the outset by providing nutrition with

Table 1–1. Major Diagnostic Categories Associated With Swallowing and Feeding Disorders in Infants and Children

Neurologic	Encephalopathies (e.g., cerebral palsy, perinatal asphyxia) Traumatic brain injury Neoplasms Intellectual disability Developmental delay
Anatomic and structural	Congenital (e.g., tracheoesophageal fistula and esophageal atresia, cleft palate) Acquired (e.g., tracheostomy, vocal fold paralysis or paresis)
Genetic	Chromosomal (e.g., Down syndrome) Syndromic (e.g., Pierre Robin sequence, Treacher Collins syndrome, CHARGE syndrome) Inborn errors of metabolism
Secondary to systemic illness	Respiratory (e.g., bronchopulmonary dysplasia, chronic lung disease of prematurity, bronchopulmonary dysplasia) Gastrointestinal (e.g., inflammatory conditions, GI dysmotility, constipation) Congenital cardiac anomalies
Psychosocial and behavioral	Oral deprivation Secondary to unresolved or resolved medical condition Iatrogenic

visual and auditory stimulation of loving and concerned parents. Thus, swallowing and feeding disorders likely have negative impact not only on the physical but also on the psychosocial well-being of the infant and child with caregivers.

Sensorimotor Function

The epidemiology of oral sensorimotor dysfunction in the general population and in the population of children with neurologic impairments is not well defined. Precise incidence and prevalence data are difficult to ascertain. Cerebral palsy (CP) serves as an example of the range of estimates that continue to be similar from multiple sources that have reported approximately 20% to 85% of children with CP are believed to have swallowing difficulties at some time during their lives (Benfer, Weir, Bell, Ware, Davies, & Boyd, 2013; Parkes, Hill, Platt, & Donnelly, 2010). During the first year of life of all children with CP, 57% are estimated to have problems with sucking, 38% with swallowing, and 33% with malnutrition (Reilly, Skuse, & Poblete, 1996). As the severity of CP increases, not surprisingly the severity of the oral sensorimotor dysfunction increases. The most severely affected are children with spastic quadriplegia, 90% of whom have swallowing and feeding problems (Benfer et al., 2013; Paulson & Vargus-Adams, 2017; Stallings, Charney, Davies, & Cronk, 1993). During the first five years of life, the overall incidence of dysphagia decreases in children with CP and particularly in those with better baseline and improving gross motor function (Benfer, Weir, Bell, Ware, Davies, & Boyd, 2017). These findings suggest that gross motor skills and their improvement may herald those at risk for “persistent” dysphagia.

Team Approaches to Swallowing/Feeding Disorders

Feeding disorders that may or may not include swallowing deficits (dysphagia) manifest in many different ways. Resistance to accepting foods, lack of energy for the work of oral feeding, and oral sensorimotor disabilities broadly encompass most problems (Gisel et al., 1998; Kerzner, Milano, MacLean, Berall, Stuart, & Chatoor, 2015). Effective management of these medically complex children depends on the expertise of many specialists working independently and as a team (Chapter 9). A few examples follow, not intended to be an inclusive list, since different institutions and professionals within those institutions, carry out patient care in multiple ways. Some teams may specialize in specific underlying etiologies or presentations, for example, Aerodigestive Clinic, Foregut Clinic (focused specifically on children with tracheoesophageal fistula and esophageal atresia (TEF/EA), Tracheostomy/Ventilator Clinic, Craniofacial Team with a subspecialty clinic for those children with feeding disorders. Team approaches also may differ depending on availability of resources that may even include “virtual” teams. It is important that teams can offer coordinated consultation and problem-solving for co-occurring etiologies and interrelated problems. Essential components can be incorporated in all types of teams (Table 1–2). The family’s ability to synthesize and cope with multiple, sometimes disparate opinions must also be a top priority. Whenever possible, an *interdisciplinary* team model is encouraged. This approach refers to interaction of a group of professionals who meet in person with family allowing for optimal efficient communication. Regardless of the type of team, each

Table 1–2. Essential Components for Successful Feeding Teams

- Collegial interaction among relevant specialists with active family involvement
- Shared group philosophy for diagnostic approaches and treatment protocols
- Team leadership with organization for evaluation and information sharing
- Willingness to engage in creative problem-solving and research
- Time commitment for the labor-intensive nature of such work

professional brings expertise that is useful in the solution of complex medical problems. A group philosophy for both evaluation and treatment engenders respect for other team members' expertise. An organized structure with a clearly defined leader is important. Finally, a shared fund of knowledge is critical and results in creative problem-solving and fruitful research. In situations where interdisciplinary teams are not possible, professionals are urged to develop strategies that promote effective communication with parents and other primary caregivers. Team member roles are similar regardless of the specific type team, with all professionals providing services within their scope of practice and training. Most importantly, parents/caregivers are integral members of any team.

Over the past 20 years, there has been increased recognition of the complex interface between feeding disorders and swallowing impairments in children. The term *feeding disorder* refers to inappropriate development of oral intake and its associated medical, nutritional, and psychosocial consequences. Swallowing impairments are more specific to the process of deglutition. Hence, all children with swallowing impairments have feeding disorders, but not all children with feeding disorders have swallowing impairments. Importantly, swallow-

ing impairments can lead to the development of feeding disorders. Different types of models and settings have emerged to accommodate assessment and treatment of specific patient populations. Some teams function primarily in an outpatient setting and serve as a transitional bridge between inpatient and outpatient settings. Names for such teams vary and may include the following: Feeding Clinic; Feeding Disorders Clinic; Nutrition Clinic; or Swallowing, Feeding, and Nutrition Clinic; and Feeding and Growing Clinic. Inpatient swallowing and feeding teams may be separate from outpatient teams that have different personnel. Some teams work across in- and outpatient settings for assessment and management of children with specific diagnoses or presentations. Such teams also vary and may include craniofacial and aerodigestive teams. The core team members usually include a physician and other health care providers as dictated by the needs of the patient population. The primary oral sensorimotor swallow therapist is most likely to be a speech-language pathologist, although in some instances an occupational therapist may be primary. All teams benefit from both when underlying knowledge and experience is extensive with infants and children demonstrating swallowing and feeding disorders.

Ethical and Legal Challenges Underlying Care for Children With Swallowing/Feeding Disorders

In addition to making evidence-based decisions, all team members must adhere to the moral and ethical principles within the framework of their professions as well as their scopes of practice (Arvedson & Lefton-Greif, 2007; Horner, Modayil, Chapman, & Dinh, 2016). Ethics is a discipline that uses a systematic approach to examine morality with the intent of promoting the overall welfare of the community (Lefton-Greif & Arvedson, 1997). The four primary principles of ethical decision-making, respect for autonomy, beneficence, nonmaleficence, and justice, are reviewed in detail in Beauchamp and Childress (1994) and Purlilo (1988). Adherence to these four commitments is critical to decision making that goes beyond the realm of facts by rendering judgements. In addition, for pediatrics, decision making must take into account in “the child’s best interests.” Bioethics is the discipline that deals with ethical issues that arise with advances in medicine. Hence, bioethical dilemmas are not typically defined by professional codes of ethics and are often controversial. Bioethical questions may include issues that range from allocation of resources (e.g., expensive drugs used in rare diseases) to stem cell research. As medical advances continue, it is likely that all professions involved with children with dysphagia will be called on to address bioethical quandaries.

Special Considerations for School, Home, and Residential Settings

Oral sensorimotor and swallowing specialists frequently function outside of a hospi-

tal setting and outpatient clinic. Assessment and treatment for children with complex feeding and other medical problems are common in a variety of educational (school-based) and residential (home-based) settings. Working knowledge of the challenges faced by infants and children with a wide variety of swallowing problems is mandatory. Families may be followed through a center or home-based educational program. These services have been mandated by federal legislation that guarantees a free and appropriate educational program for all handicapped children. The Education for All Handicapped Children Act (1975–1990) was revised in 1990 and became known as Individuals with Disabilities Education Act (IDEA–Public Law No. 94-142). This law was established to guarantee that all students with disabilities are provided with the same access to public education as students without disabilities. “IDEA is composed of four parts, the main two being part A and part B. Part A covers the general provisions of the law, Part B covers assistance for education of all children with disabilities, Part C covers infants and toddlers with disabilities, which includes children from birth to age three years, and Part D is the national support programs administered at the federal level. Each part of the law has remained largely the same since the original enactment in 1975 Individuals with Disabilities Education Act (2017, November 13).” Section 504 of the Rehabilitation Act of 1973, as amended (Section 504), clarified information about the Americans with Disabilities Act (ADA, 2008) in the areas of public elementary and secondary education (U.S. Department of Education, 2015). The ADA (2008) broadened the interpretation of disability, which clearly includes eating. Schools are bound by IDEA and 504 because of their responsibility to provide a free and appropriate public education (FAPE).

Challenges in Caring for Children With Swallowing/Feeding Disorders

A comprehensive approach to children with swallowing and oral sensorimotor function problems can be hampered by the lack of a shared fund of knowledge. A clearly defined set of terms related to this rapidly expanding field is necessary. Several terms will be defined here with others defined as they are encountered throughout the book. *Deglutition*¹ is the act of swallowing and is just one process in the broader context of feeding. Swallowing refers to the entire act of deglutition from placement of food and liquid into the mouth until they enter the upper esophagus. Sucking, chewing, and swallowing are three physiologically distinct processes occurring during deglutition (Kennedy & Kent, 1985). Estimates of the frequency of swallowing have ranged from 600 to 1,000 times per day (Lear, Flanagan, & Moorrees, 1965). The highest frequency is during food intake, and the lowest is during sleep. Aside from providing nourishment and hydration, swallowing accomplishes other purposes, such as the removal of saliva and mucous secretions from the oral, nasal, and pharyngeal cavities. A decrease in swallowing frequency may be coupled with oral sensorimotor dysfunction and thereby may result in severe drooling (Chapter 11).

Feeding is a broad term to encompass the process for getting food/liquid into the mouth (<https://en.oxforddictionaries.com/definition/deglutition>). Once food and liquid enter the mouth, the process continues with bolus formation as the initial process to include sucking and chewing (depending on the composition of the food or liquid) that leads to moving food/liquid through

the mouth, into the pharynx for initiation of swallowing. *Dysphagia* is a swallowing deficit (<https://en.oxforddictionaries.com/definition/dysphagia>). *Oral sensorimotor function* refers to all aspects of sensory and motor functions involving the structures in the oral cavity and pharynx related to swallowing from the lips until the onset (or initiation) of the pharyngeal phase of the swallow (Chapter 2). Finally, *nutrition* is the process by which all living organisms obtain the food and nourishment necessary to sustain life and support growth (<https://en.oxforddictionaries.com/definition/us/nutrition>).

Care for children with swallowing and feeding disorders requires a broad knowledge base that must be supplemented by a thoughtful and often creative problem-solving approach. The steps in this approach are universal to the diagnosis and treatment of any medical condition or illness. Their importance to the approach of a medically complex child cannot be overemphasized. Team care is most effective in developing alternate strategies when normal swallowing is absent and nutrition is severely compromised (Table 1–3).

Table 1–3. Process Steps for Diagnosis and Treatment of Pediatric Swallowing and Feeding Disorders

- Define problem feeding and swallowing
- Identify etiology(ies)
- Determine appropriate diagnostic tests
- Plan approach to patient/family
- Teach about problem, implement treatment
- Monitor progress
- Evaluate progress (outcomes focused)

¹The terms *swallowing* and *deglutition* have been used interchangeably. The term *swallowing* will be used throughout the text, unless distinguishing between these terms is relevant to the text.

Clinical and Research Updates for the Care of Children With Swallowing/Feeding Disorders

This third edition provides updated clinical and research findings that have direct impact on care for infants and children with swallowing and feeding disorders. Emphases continue to be placed on the critical importance of a fund of knowledge across multiple systems that are factors in children of all ages and all underlying etiologies. Clinical approaches are presented and discussed in ways that readers are expected to find useful in the evaluation and management of infants and children with oral sensorimotor dysfunction and swallowing problems.

The next several chapters cover information that provides a basis for understanding the common problems associated with swallowing and feeding disorders. Knowledge of anatomy, embryology, physiology, and pathophysiology of the upper aerodigestive tract is fundamental for the understanding of infants and children with a wide range of swallowing and feeding disorders. The following chapters focus on neurodevelopment (normal and abnormal), airway, gastroenterology, and nutrition. These chapters are followed by a chapter on oral sensorimotor clinical feeding evaluation and a chapter on instrumental assessment with primary focus on videofluoroscopic swallow studies and fiberoptic endoscopic examination of swallowing. Significant clinical and research advances over the past 10 years are highlighted in these chapters as well as the chapter on decision making regarding management strategies and intervention.

Chapters that follow cover specific topics including aspiration and saliva/secretion management. The chapter on cranio-

facial anomalies has an entirely new section focused on the genetic basis of conditions associated with swallowing/feeding problems in infants and children with craniofacial anomalies. The final chapter focuses on children with psychologic and behavioral problems, often accompanied by sensory factors, as major components in their feeding disorders. The importance of integrating these factors that include parent/child relationships cannot be overstated. Functional outcome is the goal for every child and family.

Clinical case studies that are found at the end of most chapters provide concrete examples of teamwork with varied emphases that encompass the depth and breadth of pediatric feeding disorders. Evaluation and treatment approaches are included where supported by clinical experience and the scientific literature. Medical, psychosocial, and satisfaction outcomes are reported when available. Although there are some reports in recent years, the literature continues to be sparse in the areas of pediatric swallowing and feeding in normal development as well as disorders.

Strong emphasis continues to be placed on the importance of making a diagnosis based on etiology of disease preceding treatment. All professionals involved in assessment and management of infants and children in both medical and educational settings must have appropriate knowledge and training to assess and treat infants and children with dysphagia and related conditions. All decision-making, communications, and interactions with families and other professionals must be carried out with adherence to the respective professional ethical codes of conduct. The overall importance of an appropriate fund of knowledge and shared experience employing team approaches is emphasized throughout this third edition as in the earlier editions of this book.