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Pediatric Feeding Disorder—Consensus Definition and Conceptual Framework

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ABSTRACT

Pediatric feeding disorders (PFDs) lack a universally accepted definition. Feeding disorders require comprehensive assessment and treatment of 4 closely related, complementary domains (medical, psychosocial, and feeding skill-based systems and associated nutritional complications). Previous diagnostic paradigms have, however, typically defined feeding disorders using the lens of a single professional discipline and fail to characterize associated functional limitations that are critical to plan appropriate interventions and improve quality of life. Using the framework of the World Health Organization *International Classification of Functioning, Disability, and Health*, a unifying diagnostic term is proposed: ''Pediatric Feeding Disorder'' (PFD), defined as impaired oral intake that is not age-appropriate, and is associated with medical, nutritional, feeding skill, and/or psychosocial dysfunction. By incorporating associated functional limitations, the proposed diagnostic criteria for PFD should enable practitioners and researchers to better characterize the needs of heterogeneous patient populations, facilitate inclusion of all relevant disciplines in treatment planning, and promote the use of common, precise, terminology necessary to advance clinical practice, research, and health-care policy.

Key Words: dysphagia, failure to thrive, feeding disorder

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What Is Known

- Pediatric feeding disorders lack a universally accepted definition.
- Previous diagnostic paradigms have defined feeding disorder from the perspective of a single medical discipline.

What Is New

- A unifying diagnostic term, ''Pediatric Feeding Disorder'', using the framework of the World Health Organization International Classification of Functioning, Disability, and Health is proposed.
- This term unifies the medical, nutritional, feeding skill, and/or psychosocial concerns associated with feeding disorders.
- The proposed diagnostic criteria should promote the use of common, precise, terminology necessary to advance clinical practice, research, and health care policy.

Feeding is a complex process that requires interaction of the central and peripheral nervous systems, oropharyngeal mechanism, cardiopulmonary system, and gastrointestinal (GI) tract with support from craniofacial structures and the musculoskeletal system. This coordinated interaction requires acquisition and mastery of skills appropriate for a child's physiology and developmental stage. In children, feeding occurs in the context of the caregiver-child dyad. A disruption in any of these systems places a child at risk

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for a feeding disorder and associated complications (1,2). Often, more than 1 system is disrupted, contributing to the development and persistence of pediatric feeding disorders (PFDs) (3). Hence, effective assessment and treatment of PFDs require the involvement of multiple disciplines. The lack of a universally accepted definition has, however, hindered collaborative care.

Despite inherent multiple underlying mechanisms and need for multidisciplinary care, the diagnosis of feeding disorders has been approached unilaterally, with each discipline suggesting its own approach. These unilateral paradigms typically do not capture the complexity of feeding disorders. The American Speech-Language-Hearing Association defines pediatric dysphagia in terms of impaired oral, pharyngeal, and/or esophageal phases of swallowing (4). The *Diagnostic and Statistical Manual of Mental Disorders, 5th Edition* diagnosis of Avoidant/Restrictive Food Intake Disorder incorporates nutritional complications and acknowledges that feeding disorders are common in certain medical conditions; however, it requires that severity of the eating disturbance exceeds that associated with the condition and specifically excludes children whose primary challenge is a skill deficit (5,6).

Historically, feeding disorders were defined using an organic/nonorganic dichotomy. The *International Statistical Classification of Diseases and Related Health Problems, 10th Revision* (*ICD-10*) diagnostic codes for PFDs either requires the absence of organic disease (F98.2: Other feeding disorders of infancy and childhood) or uses the nonspecific, poorly defined R63.3: Feeding difficulties (7). Existing diagnostic codes are clearly inadequate to describe the multiple factors involved in a feeding disorder (8).

In this article, use of the *International Classification of Functioning, Disability, and Health (ICF)* framework to define a unifying diagnostic term, ''pediatric feeding disorder'' (PFD) is proposed. The World Health Organization *ICF* framework defines *functioning* as an umbrella term referring to all body functions, activities, and participation, and defines *disability* as an umbrella term covering impairment (a problem in body function or structure), activity limitation (difficulty encountered in executing a task or action), and participation restriction (problem experienced in involvement in life situations). The *ICF* framework complements the *ICD-10* (9), and emphasizes a holistic understanding of the physiologic and functional impact of PFD, including the impaired mechanisms, environmental barriers, and facilitators and, most importantly, the impact on participation in daily family and community life. The proposed diagnostic criteria in this article result from deliberations among a panel of experts well versed in the care of children with feeding disorders. The diagnostic criteria were derived from a combination of evidence, when available, and expert opinion.

Since the publication of the World Health Organization *ICF*, there is increasing recognition that diagnoses do not necessarily predict function, and that assessment of functional limitations is critical to planning appropriate interventions to improve quality of life (10). PFDs can profoundly impact a child's physical, social, emotional, and/or cognitive function, and increase caregiver stress (3). A classification system describing the effects of a PFD on function would enable practitioners and researchers to better characterize the needs of heterogeneous patient populations, facilitate inclusion of all relevant disciplines in treatment, and allow the health care team to use a common, precise terminology necessary to advance clinical practice and research (10).

PEDIATRIC FEEDING DISORDER: DEFINITION

PFD is defined as *impaired oral intake that is not age-appropriate, and is associated with medical, nutritional, feeding skill, and/or psychosocial dysfunction*. The proposed diagnostic criteria are shown in Table 1. PFD can be classified into acute (<3 months' duration) and chronic (≥3 months' duration) (11).

The proposed reference standard for oral intake is age-appropriate feeding: the progressive acquisition of feeding skills enabling progression from breast or bottle feeding to self-feeding a variety of age-appropriate table foods. Children with developmental delays may have feeding skills appropriate for their level of development but not their age; hence, these children will have a diagnosis of PFD.

In the proposed definition, impaired oral intake refers to the inability to consume sufficient food and liquids to meet nutritional and hydration requirements. The definition excludes the inability to take medications or atypical, unpalatable foods. To eliminate transient feeding problems resulting from acute illness, impaired oral intake must be present daily for at least 2 weeks.

To distinguish between PFD and eating disorders (eg, anorexia nervosa), PFD should be diagnosed only in the absence of body image disturbances. Although pica and rumination can be associated with PFD, their presence alone does not constitute PFD (12).

According to the ICF framework, disability results when impairments interact with personal and environmental factors to result in activity limitations or participation restriction. PFD results in disability (13). For example, impaired ability to eat leads to participation restrictions or modifications in childcare, school, and other environments that involve mealtime interactions. In later life,

TABLE 1. Proposed diagnostic criteria for pediatric feeding disorder

A. A disturbance in oral intake of nutrients, inappropriate for age, lasting at least 2 weeks and associated with 1 or more of the following:
   1. Medical dysfunction, as evidenced by any of the following*:
      a. Cardiorespiratory compromise during oral feeding
      b. Aspiration or recurrent aspiration pneumonitis
   2. Nutritional dysfunction, as evidenced by any of the following†:
      a. Malnutrition
      b. Specific nutrient deficiency or significantly restricted intake of one or more nutrients resulting from decreased dietary diversity
      c. Reliance on enteral feeds or oral supplements to sustain nutrition and/or hydration
   3. Feeding skill dysfunction, as evidenced by any of the following‡:
      a. Need for texture modification of liquid or food
      b. Use of modified feeding position or equipment
      c. Use of modified feeding strategies
   4. Psychosocial dysfunction, as evidenced by any of the following§:
      a. Active or passive avoidance behaviors by child when feeding or being fed
      b. Inappropriate caregiver management of child's feeding and/or nutrition needs
      c. Disruption of social functioning within a feeding context
      d. Disruption of caregiver-child relationship associated with feeding
B. Absence of the cognitive processes consistent with eating disorders and pattern of oral intake is not due to a lack of food or congruent with cultural norms.

The following International Classification of Functioning, Disability and Health (ICF) categories apply to each of the criteria above and can be used to describe the functional profile of affected patients.

*Medical dysfunction: impaired functions of the cardiovascular and respiratory systems.

†Nutritional dysfunction: any impaired body functions and structures, environmental factors (products and substances for personal consumption).

‡Feeding skill dysfunction: limitations in activities/participation related to eating.

§Psychosocial dysfunction: limitations in activities/participation related to interpersonal interactions and relationships.

PFD can impair attainment of social relationships and employment (9). Because the definition of disability is dependent on environmental factors (the physical, social, and attitudinal environment in which people live and conduct their lives), culturally specific feeding behaviors in the absence of dysfunction do not qualify as PFD.

Four important domains underlie PFD: medical, nutritional, feeding skills, and psychosocial. Because of interplay between these domains, impairment in one can lead to dysfunction in any of the others. The result is PFD. Disability resulting from interactions among health conditions, personal factors, and environmental factors are discussed below.

MEDICAL FACTORS

Impaired structure/function of the GI, cardiorespiratory, and neurological systems are frequently associated with dysphagia that results in dysfunction in 1 or more feeding domains, and PFD. (Supplementary Table 1, Supplemental Digital Content, *http://links.lww.com/MPG/B507*) The impairments related to medical conditions give rise to dysfunction through several mechanisms.

Upper GI tract dysfunction is associated with PFD, arising primarily from a GI anomaly or disease, or secondarily from respiratory or airway pathology. Oropharyngeal and laryngeal anomalies can impair the mechanics of normal feeding. Inflammatory diseases of the upper GI tract may also impair normal feeding. Although there is insufficient documented evidence to support a strong association between gastroesophageal reflux disease and PFD, the link between PFD and eosinophilic esophagitis is better established (14). Motility and functional GI disease also may impair feeding including children with repaired esophageal atresia (15), post-fundoplication (16), and feeding volume intolerance independent of gastroparesis in medically complex children.

Diseases of the airway and lungs are the other components of ''aerodigestive disease'' and can also result in PFD, particularly in young children with chronic tachypnea, where the suck-swallow-breathe coordination is particularly challenging. Chronic lung disease of prematurity often causes tachypnea and dyspnea that affect swallowing and feeding skill acquisition (17). Aspiration resulting from PFD can manifest as lower respiratory tract infections (eg, pneumonia), but is more commonly identified via fluoroscopy based on subtle respiratory signs/symptoms and/or other clinical manifestations (eg, feeding refusal in infancy).

Children with congenital heart disease may require prolonged hospitalization with critical care interventions that can delay and subvert the acquisition of feeding skills. Cardiac surgery can result in recurrent laryngeal nerve injury with left vocal fold paralysis and impaired airway protection. Chronic hypoxia and possible vagal injury may play a role in feeding intolerance and vomiting in these children (18).

Children with neurologic impairments are at increased risk for PFD, particularly as they grow and reach points where nutritional needs exceed their feeding skills (19). Generally, children with more severe motor and cognitive delays have greater feeding impairment (20). Neurogenic dysphagia is common during infancy but may present later secondary to cerebral palsy, leading to morbidity and mortality from chronic aspiration (21).

Neurodevelopmental disorders, specifically autism spectrum disorder, are also associated with PFD (22). Finally, some children who consume inadequate calories for normal growth may have a disorder of appetite signaling mechanisms causing PFD.

NUTRITIONAL FACTORS

Many children with PFD have a restricted quality, quantity, and/or variety of beverages and foods consumed, placing them at risk of malnutrition, overnutrition, micronutrient deficiency or toxicity, and dehydration (Supplementary Table 2, Supplemental Digital Content, *http://links.lww.com/MPG/B507*). Malnutrition is defined as intake of nutrients insufficient to meet nutritional requirements, resulting in ''cumulative deficits of energy, protein or micronutrients'' that may adversely impact growth, development, and health (23). Malnutrition affects 25% to 50% of children with PFD (24,25) and is most prevalent among those with chronic disease or neurodevelopmental disorders (26).

The restricted dietary diversity common in PFD can have other adverse nutritional consequences. Exclusion of entire food groups, such as fruits and vegetables, can result in micronutrient deficiency despite adequate macronutrient intake (27–30). Children with excessive intake of specific foods, beverages, or dietary supplements can experience micronutrient excess or, rarely, toxicity (22). Excessive energy intake, especially in the setting of lower energy requirements, can result in obesity (31).

FEEDING SKILL FACTORS

Altered feeding experiences due to illness, injury, or developmental delay may lead to impairment of feeding skills. Neurodevelopmental delay inhibiting feeding may become evident any time in the first few years of life, during periods of change in oropharyngeal anatomy and neuromuscular coordination, texture transitions, and transitions in feeding/drinking utensils (32,33). Specific impairments in oral and pharyngeal sensory-motor functioning may also inhibit feeding skills. In addition, altered oral experiences from physical injury, deficits in neurologic functioning (34), abnormal oral structure or function (35), and/or adverse or limited feeding experience (36–39) can cause feeding skills impairment (Supplementary Table 3, Supplemental Digital Content, *http://links.lww.com/MPG/B507*).

Impairment in *oral sensory functioning* inhibits/limits acceptance and tolerance of liquids and food textures expected for age; it may be associated with specific characteristics of liquids and food textures such as the flavor, temperature, bolus size, viscosity, texture, or appearance (40,41). Under-response or hyposensitivity is generally characterized by lack of awareness of food within the mouth, limited bolus formation, loss of food from the mouth, increased bolus size, and gagging or refusal of liquids and food textures that provide inadequate sensory input. These children characteristically seek increased bolus size or exaggerated flavors, temperatures, and textures. Over-response or hypersensitivity is generally characterized by gagging with specific textures or bolus size, excessive chewing, and limited variety of intake. These children characteristically seek bland flavors, finely grained textures, small bolus sizes, and room-temperature foods.

Impairment in *oral motor functioning* limits bolus control, manipulation, and/or transit of liquids and solids; it can be characterized by inefficient intake, messy eating, poor control of liquids and foods, slow or ineffective bolus formation and propulsion, gagging during bolus formation, and postswallowing residue (42).

Although the clinician can evaluate the oral phases visually, evaluation of *pharyngeal structures* and their function requires instrumental assessment using a modified barium swallow or fiberoptic endoscopic evaluation of swallowing (37,38,43). Impairment in *pharyngeal sensation* inhibits airway protection and efficient swallowing; it is often associated with poorly timed and coordinated swallowing during pharyngeal transit, poor awareness of bolus location, presence of pharyngeal residue post-swallow, and silent aspiration. Clinical characteristics of sensory impairment can include gulping or audible swallows, too many or too few swallows per bolus, wet vocalization, and no attempts to clear residue after swallowing (44,45).

Impairment in *pharyngeal motor functioning* inhibits pharyngeal movements. It may be evidenced by reduction in strength and coordination of pharyngeal constrictors, velar and laryngeal elevation, and vocal fold closure. Symptoms can include multiple effortful swallows per bolus, throat clearing, pharyngonasal flow, chronic nasal congestion, inability to clear residue, and poor airway protection.

Skill-based Dysfunction

To be fully functional, a child's feeding skills must be safe, age appropriate, and efficient. Dysfunction in any of these areas constitutes PFD.

Unsafe oral feeding may present as choking, aspiration, adverse cardiorespiratory events (eg, apnea, bradycardia) during oral feeds, or other adverse mealtime events (eg, gagging, vomiting, fatigue, refusal) (46,47).

Delayed feeding skills may present as a child who is unable to consume age-appropriate liquid and food textures. The child may require food/fluid to be modified from its original form (eg, blending solids into a purée) or may rely on a natural variant (eg, a naturally smooth food) that is not age appropriate. These children may have deficits in use of feeding utensils and devices or self-feeding skills. They may require special feeding equipment, positioning, or feeding strategies (32,33).

Inefficient oral feeding may present as prolonged mealtime duration (ie, >30 minutes) or inadequate oral intake. These children may require modified textures, special feeding equipment or strategies, or nutritional supplementation (32,33).

PSYCHOSOCIAL FACTORS

Factors within the child, caregiver, and the feeding environment (psychosocial impairments) can adversely affect feeding development and ultimately contribute to and maintain PFD (48,49). Problem feeding behaviors are the resultant dysfunction and are often among the first concerns that caregivers express regarding feeding their child (50).

Psychosocial Impairments

Psychosocial factors in the child and/or caregiver can contribute to feeding dysfunction (51) and are characterized as Developmental Factors, Mental and Behavioral Health Problems, Social Factors, or Environmental Factors (Supplementary Table 4, Supplemental Digital Content, *http://links.lww.com/MPG/B507*) (48,49). Although problems in any of these domains can lead to feeding dysfunction, most commonly PFD results from an interaction among any or all 4 domains (6,52).

Developmental factors resulting in delays of motor skills, language, socialization, and cognition can contribute to the development of PFD. These delays often result in a mismatch between the feeding abilities of the child and the feeding expectations of adult caregivers who are responsible for feeding the child. For example, if a caregiver's expectations of what a child should eat are not congruent with what a child can eat due to delays in skill development, this incongruence can contribute to aversive feeding experiences resulting in a PFD, particularly if the caregiver persists in attempting to feed the child in a chronologically age-typical manner (53).

Mental and behavioral health problems in the child, caregiver, or dyad can adversely influence feeding behavior (54). In a child, dysregulated temperament, mood disorders, anxiety, or disordered thinking can increase rates of disruptive feeding behavior (55). In a caregiver, stress and/or other mental health factors can alter mealtime interactions (56). These factors may impact how the caregiver approaches the feeding situation, resulting in over- or undercontrolling parenting practices. These factors act bidirectionally within the child-caregiver dyad (51).

Social influences including caregiver-child interactions and cultural expectations within a mealtime context can impact a child's behavior at mealtimes. For example, a caregiver's strategies for general management of problem behavior may not be effective in managing mealtime-specific behavior problems. Caregivers may misinterpret a child's hunger and satiety cues, interrupting the development of positive learning about eating. Finally, a caregiver's cultural beliefs about feeding and nutrition may not be consistent with expectations of others (eg, American Academy of Pediatrics guidelines, expectations of teachers and healthcare providers), which may affect how the caregiver feeds the child and how the child responds.

Environmental factors can contribute to the development of PFD. During meals, a distracting feeding environment (eg, use of television or other electronic devices) or resorting to feeding only at times when a child is asleep, may prevent caregivers from providing appropriate responses to mealtime behavior or can lead to the inadvertent reinforcement of problematic mealtime behavior by well-intentioned caregivers (eg, replacing refused foods with highly preferred foods, attending to crying) (57). An inconsistent mealtime schedule can adversely affect appetite and subsequently mealtime behavior (53). Unavailability of food resources can affect how and what a caregiver feeds their child, which can subsequently affect the child's feeding behavior.

Psychosocial Dysfunction

PFD can develop as a result of the impairments described above and generally manifests as one of the following (49):

Learned feeding aversions result when a child repeatedly experiences physical or emotional pain or discomfort during feedings. Over time, the child develops strategies to avoid the aversive feeding situations. When these strategies succeed, the behaviors and learned aversion are strengthened (48).

Stress and distress in the child and/or caregiver are expressed as negative emotions or as disengagement from meals (3,56).

Disruptive behavior that is incompatible with eating. These behaviors can be active (eg, pushing food away, elopement, aggression toward the caregiver) or passive (eg, refusal to self-feed).

Food overselectivity (picky eating) is defined as eating a limited variety of foods or unwillingness to try new foods, despite the ability to eat a broader diet (58).

Failure to advance to age-appropriate diet despite adequate skill (54).

Grazing is defined as consuming small amounts of food or fluid throughout the day. It causes a false sense of satiety and often leads to reduced intake (59).

Caregiver use of inappropriate strategies to improve child nutritional status (59). Some compensatory strategies are functional, but maladaptive. Instead of improving nutritional status, maladaptive compensatory strategies can perpetuate or worsen malnutrition and other manifestations of feeding dysfunction. Examples include offering only preferred foods, feeding a child that has the skills to self-feed, forced feeding, or giving fluid via infant bottle outside of the recommended age for bottle feeding.

CONCLUSIONS

These proposed diagnostic criteria for PFD use a conceptual framework that goes beyond disease-oriented or unilateral diagnostic paradigms, defining PFD as restricted oral intake that is not age

appropriate and leads to dysfunction in at least one of 4 closely related, complementary domains. Adoption of this definition by healthcare professionals from all disciplines will establish a common terminology that could have widespread impact on clinical practice, education, research, and advocacy.

These criteria aim to create a platform for change to ensure infants and children with PFD receive the best care possible and that the families receive the broadest community support available. This framework supports advocacy by family and professional organizations, and promotion of increased training opportunities, to ensure that children with PFD have access to all specialists needed for optimal management. Although not all children have impairment in all 4 domains, initial evaluation of each domain is strongly recommended because the same presenting symptoms and signs can yield distinct, complementary domain-specific recommendations needed for successful treatment to promote optimal function (60). Optimal care of children with PFD requires a team approach (Supplementary Table 5, Supplemental Digital Content, *http://links.lww.com/MPG/B507*), but many patients are unable to access evaluations in all 4 domains, due to lack of insurance coverage or lack of available specialists in their geographic location.

By promoting usage of a consistent, comprehensive, interdisciplinary terminology that encompasses both physiologic impairment and function, this definition has the potential to facilitate interdisciplinary collaboration; promote educational curricula to train practitioners; promote research investigating best practices; and allow comparison of outcomes between studies and clinical programs. This, in turn, may lead to recognition of specific diagnostic subtypes with treatment or prognostic implications. Additional systems-oriented advantages include the ability to partner with policymakers so that PFD is a qualifying diagnosis for early intervention services under part C of the Individuals with Disabilities Education Act; and stimulate changes to the *ICD-10* codes and insurance coverage policies to allow for improved reimbursement and coverage of infants and children for rehabilitative services.

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REFERENCES

1. Bryant-Waugh R, Markham L, Kreipe RE, et al. Feeding and eating disorders in childhood. *Int J Eat Disord* 2010;43:98–111.
2. Sharp WG, Jaquess DL, Morton JF, et al. Pediatric feeding disorders: a quantitative synthesis of treatment outcomes. *Clin Child Fam Psychol Rev* 2010;13:348–65.
3. Greer AJ, Gulotta CS, Masler EA, et al. Caregiver stress and outcomes of children with pediatric feeding disorders treated in an intensive interdisciplinary program. *J Pediatr Psychol* 2008;33:612–20.
4. (ASHA) AS-L-HA. Pediatric Dysphagia. *http://www.asha.org/Practice-Portal/Clinical-Topics/Pediatric-Dysphagia/*. Accessed January 28, 2017.
5. American Psychiatric Association. Feeding and eating disorders. *Diagnostic and Statistical Manual of Mental Disorders*. American Psychiatric Association: Washington, DC; 2013.
6. Silverman AH. Interdisciplinary care for feeding problems in children. *Nutr Clin Pract* 2010;25:160–5.
7. International Statistical Classification of Diseases and Related Health Problems 10th Revision. *http://apps.who.int/classifications/icd10/browse/2016/en*. Accessed January 28, 2017.
8. Ramsay M, Gisel EG, Boutry M. Non-organic failure to thrive: growth failure secondary to feeding-skills disorder. *Dev Med Child Neurol* 1993;35:285–97.
9. World Health Organization. International Classification of Functioning, Disability and Health: ICF Geneva, Switzerland: World Health Organization; 2001.
10. Lollar DJ, Simeonsson RJ. Diagnosis to function: classification for children and youths. *J Dev Behav Pediatr* 2005;26:323–30.
11. Current estimates from the National Health Interview Survey. United States, 1983. *Vital Health Stat 10* 1986:1–182.
12. Uher R, Rutter M. Classification of feeding and eating disorders: review of evidence and proposals for ICD-11. *World Psychiatry* 2012;11:80–92.
13. World Health Organization. Disabilities. *http://www.who.int/topics/disabilities/en/*. Accessed January 28, 2017.
14. Noel RJ, Putnam PE, Rothenberg ME. Eosinophilic esophagitis. *N Engl J Med* 2004;351:940–1.
15. Kovesi T, Rubin S. Long-term complications of congenital esophageal atresia and/or tracheoesophageal fistula. *Chest* 2004;126:915–25.
16. Di Lorenzo C, Orenstein S. Fundoplication: friend or foe? *J Pediatr Gastroenterol Nutr* 2002;34:117–24.
17. Jadcherla S. Dysphagia in the high-risk infant: potential factors and mechanisms. *Am J Clin Nutr* 2016;103:622S–8S.
18. Hill GD, Silverman AH, Noel RJ, et al. Feeding dysfunction in children with single ventricle following staged palliation. *J Pediatr* 2014;164:243.e1–246.e1.
19. Adams RC, Elias ER. Council On Children With D Nonoral feeding for children and youth with developmental or acquired disabilities. *Pediatrics* 2014;134:e1745–62.
20. Arvedson JC. Feeding children with cerebral palsy and swallowing difficulties. *Eur J Clin Nutr* 2013;67(suppl 2):S9–12.
21. Christensen JR. Developmental approach to pediatric neurogenic dysphagia. *Dysphagia* 1989;3:131–4.
22. Sharp WG, Berry RC, McCracken C, et al. Feeding problems and nutrient intake in children with autism spectrum disorders: a meta-analysis and comprehensive review of the literature. *J Autism Dev Disord* 2013;43:2159–73.
23. Mehta NM, Corkins MR, Lyman B, et al. Defining pediatric malnutrition: a paradigm shift toward etiology-related definitions. *JPEN J Parenter Enteral Nutr* 2013;37:460–81.
24. Ammaniti M, Lucarelli L, Cimino S, et al. Feeding disorders of infancy: a longitudinal study to middle childhood. *Int J Eat Disord* 2012;45:272–280.
25. Rommel N, De Meyer AM, Feenstra L, et al. The complexity of feeding problems in 700 infants and young children presenting to a tertiary care institution. *J Pediatr Gastroenterol Nutr* 2003;37:75–84.
26. Becker P, Carney LN, Corkins MR, et al. Consensus statement of the Academy of Nutrition and Dietetics/American Society for Parenteral and Enteral Nutrition: indicators recommended for the identification and documentation of pediatric malnutrition (undernutrition). *Nutr Clin Pract* 2015;30:147–61.
27. Chandran JJ, Anderson G, Kennedy A, et al. Subacute combined degeneration of the spinal cord in an adolescent male with avoidant/restrictive food intake disorder: a clinical case report. *Int J Eat Disord* 2015;48:1176–9.
28. Corbo MD, Lam J. Zinc deficiency and its management in the pediatric population: a literature review and proposed etiologic classification. *J Am Acad Dermatol* 2013;69:616.e1–24.e1.
29. Duvall MG, Pikman Y, Kantor DB, et al. Pulmonary hypertension associated with scurvy and vitamin deficiencies in an autistic child. *Pediatrics* 2013;132:e1699–703.
30. Ma NS, Thompson C, Weston S. Brief report: scurvy as a manifestation of food selectivity in children with autism. *J Autism Dev Disord* 2016;46:1464–70.
31. Shmaya Y, Eilat-Adar S, Leitner Y, et al. Nutritional deficiencies and overweight prevalence among children with autism spectrum disorder. *Res Dev Disabil* 2015;38:1–6.
32. Benfer KA, Weir KA, Bell KL, et al. Oropharyngeal dysphagia and gross motor skills in children with cerebral palsy. *Pediatrics* 2013;131:e1553–62.
33. Dodrill P. Feeding problems and oropharyngeal dysphagia in children. *J Gastroenterol Hepatol Res* 2014;3:1055–60.
34. Kumin L, Bahr DC. Patterns of feeding, eating, and drinking in young children with Down syndrome with oral motor concerns. *Down Syndrome Quarterly* 1999;4:1–8.

35. De Vries IA, Breugem CC, Van der Heul AM, et al. Prevalence of feeding disorders in children with cleft palate only: a retrospective study. *Clin Oral Investig* 2014;18:1507–15.
36. Delaney AL, Arvedson JC. Development of swallowing and feeding: prenatal through first year of life. *Dev Disabil Res Rev* 2008;14:105–17.
37. Lefton-Greif MA, Carroll JL, Loughlin GM. Long-term follow-up of oropharyngeal dysphagia in children without apparent risk factors. *Pediatr Pulmonol* 2006;41:1040–8.
38. Morgan AT, Mageandran SD, Mei C. Incidence and clinical presentation of dysarthria and dysphagia in the acute setting following paediatric traumatic brain injury. *Child Care Health Dev* 2010;36:44–53.
39. Mussatto KA, Hoffmann RG, Hoffman GM, et al. Risk and prevalence of developmental delay in young children with congenital heart disease. *Pediatrics* 2014;133:e570–7.
40. Farrow CV, Coulthard H. Relationships between sensory sensitivity, anxiety and selective eating in children. *Appetite* 2012;58:842–6.
41. Naish KR, Harris G. Food intake is influenced by sensory sensitivity. *PLoS One* 2012;7:e43622.
42. Weir K, McMahon S, Barry L, et al. Oropharyngeal aspiration and pneumonia in children. *Pediatr Pulmonol* 2007;42:1024–31.
43. Van den Engel-Hoek L, Erasmus CE, Van Hulst KC, et al. Children with central and peripheral neurologic disorders have distinguishable patterns of dysphagia on videofluoroscopic swallow study. *J Child Neurol* 2014;29:646–53.
44. Weir K, McMahon S, Barry L, et al. Clinical signs and symptoms of oropharyngeal aspiration and dysphagia in children. *Eur Respir J* 2009;33:604–11.
45. Phalen JA. Managing feeding problems and feeding disorders. *Pediatr Rev* 2013;34:549–57.
46. Dodrill P, Gosa MM. Pediatric dysphagia: physiology, assessment, and management. *Ann Nutr Metab* 2015;66(suppl 5):24–31.
47. Tutor JD, Gosa MM. Dysphagia and aspiration in children. *Pediatr Pulmonol* 2012;47:321–37.
48. Berlin KS, Lobato DJ, Pinkos B, et al. Patterns of medical and developmental comorbidities among children presenting with feeding problems: a latent class analysis. *J Dev Behav Pediatr* 2011;32:41–7.
49. Burklow KA, Phelps AN, Schultz JR, et al. Classifying complex pediatric feeding disorders. *J Pediatr Gastroenterol Nutr* 1998;27:143–147.
50. Lindberg L, Bohlin G, Hagekull B, et al. Early food refusal: Infant and family characteristics. *Infant Mental Health J* 1994;15:262–77.
51. Davies WH, Satter E, Berlin KS, et al. Reconceptualizing feeding and feeding disorders in interpersonal context: the case for a relational disorder. *J Fam Psychol* 2006;20:409–17.
52. Poppert KM, Patton SR, Borner KB, et al. Systematic review: mealtime behavior measures used in pediatric chronic illness populations. *J Pediatr Psychol* 2015;40:475–86.
53. Kedesdy JH, Budd KS. Childhood Feeding Disorders: Biobehavioral Assessment and Intervention Baltimore, MD: Paul H. Brookes Publishing Company; 1998.
54. Silverman AH, Tarbell S. Pediatric feeding problems, undernutrition, and vomiting disorders. In: Roberts MC, Steele RG, eds. *Handbook of Pediatric Psychology.* New York, NY: Guilford Press; 2009:429–45.
55. Powell FC, Farrow CV, Meyer C. Food avoidance in children. The influence of maternal feeding practices and behaviours. *Appetite* 2011;57:683–92.
56. Garro A, Thurman SK, Kerwin ME, et al. Parent/caregiver stress during pediatric hospitalization for chronic feeding problems. *J Pediatr Nurs* 2005;20:268–75.
57. Borrero CS, Woods JN, Borrero JC, et al. Descriptive analyses of pediatric food refusal and acceptance. *J Appl Behav Anal* 2010;43:71–88.
58. Williams KE, Field DG, Seiverling L. Food refusal in children: a review of the literature. *Res Dev Disabil* 2010;31:625–33.
59. Berlin KS, Davies WH, Silverman AH, et al. Assessing family-based feeding strategies, strengths, and mealtime structure with the Feeding Strategies Questionnaire. *J Pediatr Psychol* 2011;36:586–595.
60. Sharp WG, Volkert VM, Scahill L, et al. A systematic review and meta-analysis of intensive multidisciplinary intervention for pediatric feeding disorders: how standard is the standard of care? *J Pediatr* 2017;181:116.e4–24.e4.