

# Organic and Nonorganic Feeding Disorders

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### Key Messages

- 1–5% of infants and toddlers suffer from severe feeding problems resulting in failure to thrive.
- The most common causes of feeding disorders are behavioral issues during mealtimes.
- Features of feeding difficulties include: prolonged mealtimes, food refusal lasting for at least 1 month, disruptive and stressful mealtimes, lack of appropriate independent feeding, nocturnal eating in infants and toddlers, introducing distractions to increase food intake, prolonged breast- or bottle-feeding in infants, toddlers and older children and failure to introduce advanced textures.
- Dysphagia and signs of aspirations are alerting symptoms indicating a rapid need for diagnostics and evaluation of the safety of oral feeding.

as food refusal or low quantity of food intake due to behavioral issues or underlying organic conditions. This situation concerns mostly infants and children below 6 years of age; however, feeding problems can appear also later on in life. Feeding disorders are a concern for over 10–25% of parents of otherwise healthy children below 3 years of age, but only 1–5% of infants and toddlers suffer from severe feeding problems resulting in failure to thrive. In case of premature infants or neurologically disabled children, this rate is much higher. Feeding disorders may appear as an isolated problem, mainly due to negative behaviors during feeding, or as a concomitant disorder with an underlying organic disease or structural anomaly. The newest classification also includes the feeding style presented by the caregiver (responsive, controlling, indulgent or neglectful) as a separate cause of feeding disorders.

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### Key Words

Organic feeding disorders · Nonorganic feeding disorders · Classification · Failure to thrive

### Abstract

Feeding is one of the most important interactions between caregiver and child in the first few years of life and even later on in handicapped children. Feeding disorders can present

### Introduction

Feeding is one of the most important interactions between caregiver and child, particularly in the first year of life, but even later on. In children suffering from feeding disorders of different etiologies, this interaction may be unpleasant and difficult for both, parents and children.

Feeding disorders generally present as a food refusal or lower amount of food intake than that appropriate for age due to behavioral issues or underlying organic condi-

tions. This situation concerns mostly infants and children below 6 years of age; however, feeding problems can appear also later on in life. It is important to underline the difference between feeding disorders typical for younger children and eating disorders which affect adolescents and adults such as anorexia nervosa or bulimia.

Feeding disorders are a concern for over 10–25% of parents of otherwise healthy children below 3 years of age [1], but only 1–5% of infants and toddlers suffer from severe feeding problems resulting in failure to thrive [2] (fig. 1). Feeding problems occur in 30% of preterm infants and in up to 80% of patients with neurological impairments or developmental handicaps [3, 4].

Some problems with feeding can be transient. However, there is a number of feeding disorders demanding broader diagnosis and treatment. Under physiological conditions, healthy infants and toddlers should be effectively fed in 20–30 min, without distress for either, caregiver or child. The time span between meals should be at least 2–3 h to provide a break long enough for the child to become hungry. Such regularity teaches children to recognize hunger and satiety, which is essential for self-regulation and the establishment of a normal rhythm of feeding [5].

### Lost in Classification

Feeding disorders may appear as an isolated problem, mainly due to negative behaviors during feeding, or as a concomitant disorder with an underlying organic disease or structural anomaly. Several classifications of feeding disorders have been published; the most important ones are shown in table 1 [6–10]. Recently, the group of Chatoor [9] presented a new nomenclature of feeding disorders that includes organic and nonorganic causes of feeding difficulties. For the first time, the classification included the feeding style presented by the feeder (responsive, controlling, indulgent or neglectful) as a separate cause of feeding disorders. The full classification is presented in table 2. Interestingly, in each category of feeding difficulty, the authors included parental misperception of the signs. A good example of misperceiving the physiological selectivity is food neophobia – a typical behavior, associated with adaptive evolutionary conditioning. Neophobia is mostly expressed in children around 18 months of age, who are in the so-called ‘neophobic phase’, in which they start to reduce the number and variety of accepted foods, and consumption of meat, vegetables and fruits becomes dramatically low [11]. This state, however, guided by repeated exposure, eventually resolves.

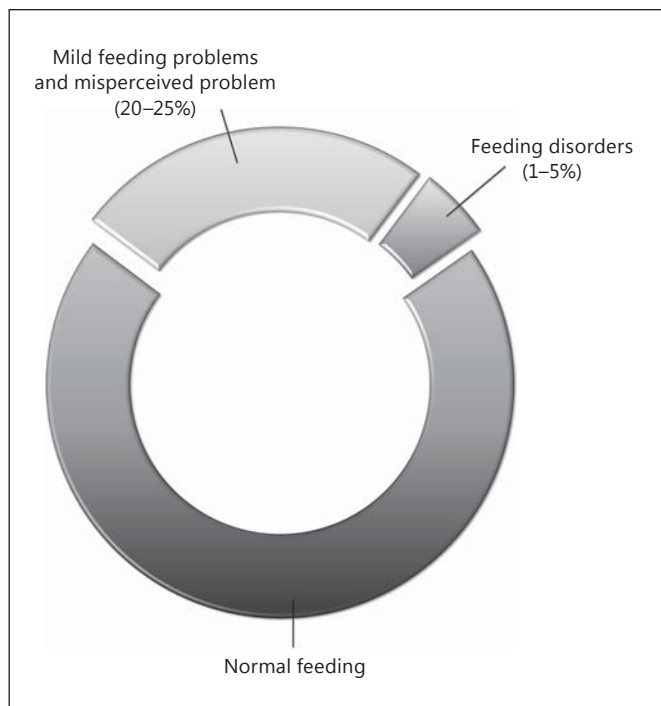


Fig. 1. Occurrence of feeding behaviors in children.

### Identifying Feeding Disorders

Feeding disorders usually present as refusal to eat, low food intake or food selectivity. In the management and treatment of feeding disorders, it is extremely important to differentiate between organic and nonorganic causes of the feeding problem. Levy et al. [8] illustrated difficulties in differentiating feeding disorders when clinicians use only the presenting symptoms. In that study, there were no significant differences in symptoms like oral retention of food, lack of hunger cues, low food intake or vomiting among children with organic and nonorganic feeding disorders. Moreover, the authors showed that the most common parental abnormal feeding behaviors were nocturnal feeding, persecutory and mechanistic feeding, forced feeding, introduction of conditional distractions and meal prolongation. Kerzner et al. [9] included additional features of feeding difficulties which are shown in table 3.

### Organic Feeding Disorders

Feeding disorders resulting from organic disease need to be properly recognized and treated according to the basic problem (table 4). In the feeding characteristics of

**Table 1.** Classifications of feeding disorders

Authors and/or title [ref.], year of publication	Classification
Burklow et al. [6], 1998	Structural abnormalities Neurological conditions Behavioral issues Cardiorespiratory problems Metabolic dysfunction Mixed problems
Zero to Three, DC: 0–3R [7], 2005	<i>Feeding behavior disorder</i> Feeding disorder of state regulation Feeding disorder of caregiver-infant reciprocity Infantile anorexia Sensory food aversions Feeding disorder associated with concurrent medical condition Feeding disorder associated with insults to the gastrointestinal tract
Levy et al. [8], 2009	<i>Acronym STOMP</i> Size Transitional feeding Organic problem Mechanistic feeding Posttraumatic feeding disorder
DSM-5 [10], 2013	<i>Avoidant/restrictive food intake disorder</i> Disturbance in eating or feeding, as evidenced by one or more of: Substantial weight loss or absence of expected weight gain Nutritional deficiency Dependence on a feeding tube or dietary supplements Significant psychosocial interference Disturbance not due to unavailability of food, or to observation of cultural norms Disturbance not due to anorexia nervosa or bulimia nervosa, and no evidence of disturbance in experience of body shape or weight Disturbance not better explained by another medical condition or mental disorder, or when occurring concurrently with another condition, the disturbance exceeds what is normally caused by that condition
Kerzner et al. [9], 2015	Limited appetite Selective intake Fear of feeding Feeding styles

patients with underlying organic disease, there are usually severe symptoms, so-called ‘red flags’, that should bring the disease to the attention of the clinician initiating further investigations. The most critical red flags are dys-

**Table 2.** Recent classification of feeding disorders [9]

Feeding difficulties	Subtypes
Limited appetite	Misperceived Energetic Apathetic Organic Structural Gastrointestinal Cardiorespiratory Neural Metabolic
Selective intake	Misperceived (including neophobia) Mildly selective Highly selective (autism) Organic Delayed development Dysphagia
Fear of feeding	Misperceived pain (colic) Infant pattern Older child (choking) Organic causes of pain Esophagitis Motility disorders Visceral hyperalgesia Tube feeding
Feeding style (dependent on the feeder)	Responsive Controlling Indulgent Neglectful

phagia and aspiration. Penetration of food into the respiratory tract would result in coughing, choking or, in case of silent aspiration, only as recurrent lung infections. For more details concerning this aspect, see the article by Dordrill and Gosa in this issue. Dysphagia or odynophagia, caused by the inflammation of the esophagus (drug-induced, allergic, eosinophilic or induced by gastroesophageal reflux disease), motor dysfunction or structural anomaly of the upper gastrointestinal tract, directly leads to food refusal as swallowing food becomes a triggering factor of pain [12]. Oropharyngeal dysphagia should be suspected in children with splitting of meals, food-associated cough or choking, drooling or repeated respiratory manifestations. It is more common in preterm newborns and children with underlying neurological disorders (table 5) [13, 14]. Other red flags in feeding disorders are vomiting, diarrhea and failure to thrive.

There are three groups of patients that are especially vulnerable for developing severe feeding disorders: pre-

**Table 3.** Symptoms of feeding difficulties [9]

Features of feeding difficulties
Prolonged mealtimes
Food refusal lasting for 1 month
Disruptive and stressful mealtimes
Lack of appropriate independent feeding
Nocturnal eating in infants and toddlers
Introducing distractions to increase intake
Prolonged breast- or bottle-feeding in toddler and older child
Failure to introduce advanced textures

term newborns, patients with neurological impairment and children with an inborn error of metabolism. Pre-term infants present difficulties with suckling due to their prematurity and alternative ways of feeding in the first days or weeks of life (including tube feeding and parenteral nutrition). For more details concerning this aspect, see the article by Lau in this issue. Moreover, premature infants suffer from difficulties in coordinating feeding, breathing and swallowing. Also, common in this group of patients are cardiorespiratory problems that create a challenge for effective feeding.

Eighty percent of patients with neurological disorders, particularly those with cerebral palsy (CP), present with dysphagia [3]. Feeding problems in children with CP can easily lead to malnutrition and seriously impair their quality of life and that of their caregivers [15]. It is important to assess the safety of oral feeding in this group, as children with CP are at a higher risk for aspiration with oral feeding, with potential pulmonary consequences [16].

Feeding difficulties can start early on in life as a consequence of gastrointestinal problems such as food allergy, gastroesophageal reflux disease or other functional diseases (gastroparesis and constipation) [17, 18]. It is important to remember, however, that these diseases cover only a small percentage of all feeding problems, with behavioral issues being the most common ones.

Among children with feeding disorders, up to 5% of problems are caused by inborn errors of metabolism, such as urea cycle disorders, organic acidosis or mitochondrial diseases. These patients often suffer from neurological symptoms, but food refusal in this group may be the result of the strict elimination diet to which they are subjected [6, 19].

The main causes of congenital sucking, swallowing and feeding disorders are lesions of the brain stem (malformations of the posterior fossa, neonatal brain stem tu-

**Table 4.** Etiology of organic feeding disorders [6, 9]

Etiology	Diseases/disorders
Neurological conditions	CP Myelomeningocele Myopathy Muscular dystrophy Myasthenia gravis Tumors of the central nervous system Encephalopathy (epileptic, ischemic – hypoxic) Craniocerebral trauma
Structural abnormalities	Short frenulum Cleft lip and/or palate Macroglossia Esophageal ring Esophageal fistula Esophageal narrowing
Cardiorespiratory problems	Congenital heart diseases Bronchopulmonary dysplasia
Metabolic dysfunction	Hereditary fructose intolerance Urea cycle disorders Organic acidosis
Gastrointestinal diseases	Food allergy Gastroesophageal reflux disease Esophagitis (drug-induced, eosinophilic, infectious) Gastroparesis Constipation

**Table 5.** Etiology of pediatric dysphagia [14]

Traumatic brain injury
Neurological disorder
CP
Prematurity
Tracheostomy or ventilator dependence
Craniofacial congenital malformations
Failure to thrive
Gastroesophageal reflux

mors, agenesis of cranial nerves, clastic lesion of the posterior brain, craniovertebral anomalies and syndromes such as Pierre Robin sequence, CHARGE, Smith-Lemli-Opitz and others) [20]. These patients often require nutritional support, including gastrostomy placement, in order to prevent malnutrition and food aspiration.

## Nonorganic Feeding Disorders

Nonorganic feeding disorders are a condition in which children show incorrect feeding behaviors such as selective intake, fear of feeding, low food intake or even food refusal, without underlying organic disease. Interestingly, behavioral problems may coexist and often add to the chronic organic problem. This problem is usually associated with psychosocial deprivation, but maternal pathology may also contribute to its occurrence [21].

There are several behavioral red flags, which indicate a more severe problem and define patients who will benefit from intensive behavioral intervention and who will require complex multidisciplinary care. For more information about treatment, see the article by Silverman in this issue. These warning signs include: food fixation (selective diet, tolerating and accepting only a few selected foods), harmful feeding (forceful and/or persecutory feeding), abrupt cessation of feeding after a trigger event and anticipatory gagging [9]. Highly selective children can limit their diet to less than 10 foods [9]. This selectivity is the most strongly expressed and commonly seen in children with autism spectrum disorders [22].

One of the most serious complications of nonorganic feeding disorder is failure to thrive. These children show growth (weight) faltering secondary to poor caloric intake in the absence of organic disease.

### Failure to Thrive

Failure to thrive describes a weight gain pattern rather than a diagnosis [23], but in clinical practice, a weight that crosses more than two major centile spaces downwards should be of concern, especially when it involves problems with diet and improper feeding behavior.

One should distinguish between mild feeding difficulties and feeding disorders often manifested with the above-mentioned behavioral red flags. As described by the group of Chatoor [9], most nonorganic feeding difficulties are either misperceived by caregivers and even pediatricians, or they are associated with the child's temperament (energetic, active child with limited appetite). The latter condition is characteristic for the difficult transition to self-feeding. These children are active, energetic, more interested in playing or in seeking contact with the

caregivers than in eating. This often results in failure in proper weight gain and leads to nutritional growth retardation. On the other hand, there is a group of inactive children, disinterested in eating but also in interacting with peers, parents or the environment. In these children, malnutrition is often evident.

In the Diagnostic and Statistical Manual of Mental Disorders (DSM-5), avoidant or restrictive food intake disorder is defined as one (or more) episodes of substantial weight loss or absence of expected weight gain, nutritional deficiency, dependence on a feeding tube or dietary supplements or significant psychosocial interference. These conditions appear without mental or medical conditions and are not present due to the unavailability of food (table 1) [10].

***Nonorganic feeding disorders are a condition in which children show incorrect feeding behaviors such as selective intake, fear of feeding, low food intake or even food refusal, without underlying organic disease.***

### Diagnostic Path in Feeding Disorders

A basic medical evaluation including anamnesis, observation of the feeding process and planning of diagnostic tests should be performed by a multidisciplinary feeding team comprising a dietician, a speech pathologist, a psychologist and a pediatrician. Such an interdisciplinary approach allows for a coordinated consultation with focus on the child as a whole and on its caregivers.

It is essential to obtain a thorough medical history concerning pregnancy, delivery, breastfeeding, time of introducing complementary foods, time of transition to self-feeding, used feeding tools (open cup, spoon or bottle with nipple), tolerated textures and accepted foods and time spent on one meal. Joint observation of feeding, while a child is offered accepted and not accepted foods, is valuable for each specialist in the feeding team. It gives detailed information on the child's and caregiver's behavior during feeding, but also reveals the child's feeding skills.

During the first consultation for a feeding problem, particularly if the child is malnourished, it is important to evaluate the patient's nutritional and caloric intake, preferably using a 3-day nutritional record completed by the caregivers at home. Psychological assessment helps to identify parental and behavioral factors that may be contributing to the feeding disorder.

Diagnostic tools used in children with feeding disorders differ depending on the leading symptoms and suspected cause. Of notice is the evaluation of safety of oral



feeding made during videofluoroscopic swallow study [24] (see the article by Dodrill and Gosa in this issue).

A contrast study of the upper gastrointestinal tract with barium or water soluble contrast is used for the exclusion of structural anomalies such as esophageal narrowing due to vascular ring or masses, esophageal stricture or fistula, but also for rough assessment of gastric emptying. An upper endoscopy can be performed if there is suspicion of esophageal inflammation. Transnasal insertion of a manometry catheter is used for the evaluation of the pharyngeal and esophageal peristalsis, as well as the upper and lower esophageal sphincter function. Imaging studies like computed tomography or magnetic resonance imaging are useful in diagnosing pulmonary disease or vascular malformations.

### Treatment

Patients with feeding disorders need a careful evaluation by an experienced feeding team and recognition and treatment of the leading problem. Many children with an underlying medical neurological condition will need a thorough evaluation of oral feeding safety and often additional nutritional support. Some patients will need behavioral treatment to overcome learned refusal and avoidance mechanisms [25, 26]. Each situation and each patient is different and, therefore, requires an individual complex evaluation by the multidisciplinary feeding team.

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***Some patients will need behavioral treatment to overcome learned refusal and avoidance mechanisms.***

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### Long-Term Complications of Feeding Disorders

Proper therapy of feeding disorders is highly effective, and in cases of children with behavioral feeding difficulties, the success rate is as high as 90%. In premature infants, factors increasing the risk of developing a severe feeding disorder include CP, developmental delay and a disordered relation between child and caregivers. But even in terms of such severe feeding problems, the effectiveness of feeding therapy is good and reaches 60% [4]. Interestingly, tube feeding on admission to the feeding team and presence of swallowing disorders are the most important predictors of treatment failure.

A long-term follow-up of 72 patients with infantile anorexia (currently defined by Chatoor and colleagues [27]

as an energetic child with limited appetite) showed that, despite partial improvement of nutritional status, feeding problems, anxiety and depressive disorders as well as behavioral issues may persist even up to 8 years of age. A correlation of feeding disorders in these children with eating problems and improper emotional reactions of their mothers was demonstrated. It should be kept in mind that often psychological therapy involves the whole family.

### Conclusions

Children with feeding difficulties are a heterogenic group, often difficult to take care of. Organizing a special, interdisciplinary medical care for them is essential for satisfactory and effective treatment. However, it is important to remember that recognizing the problem and offering basic support for parents in terms of correct feeding rules and habits is the responsibility of every pediatrician or general practitioner.

A feeding team, with a qualified dietician, a clinical psychologist, a speech pathologist and a pediatrician, performs an overall assessment of the patient, including nutritional evaluation, caloric needs, nutritional status, motor functioning essential for feeding, as well as behavior related to feeding. Such a broad approach results in optimal nutritional support, speech therapy and psychological care.

Prognosis in feeding disorders mainly depends on the underlying cause. In children with feeding disorders due to neurological diseases, the second largest group of patients with feeding difficulties, the management starts with the evaluation of the optimal and safe way of feeding and preventing malnutrition.

### Disclosure Statement

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### References

- 1 Lindberg L, Bohlin G, Hagekull B: Early feeding problems in a normal population. *Int J Eat Disord* 1991;10:395–405.
- 2 Chatoor I: *Diagnosis and Treatment of Feeding Disorders in Infants, Toddlers, and Young Children*. Washington, Zero to Three, 2009.
- 3 Aldridge VK, Dovey TM, Martin CI, Meyer C: Identifying clinically relevant feeding problems and disorders. *J Child Health Care* 2010;14:261–270.

- 4 Schädler G, Süss-Burghart H, Toschke AM, von Voss H, von Kries R: Feeding disorders in ex-prematures: causes – response to therapy – long term outcome. *Eur J Pediatr* 2007; 166:803–808.
- 5 Birch LL, Fisher JO: Development of eating behaviors among children and adolescents. *Pediatrics* 1998;101:539–549.
- 6 Burklow KA, Phelps AN, Schultz JR, McConnell K, Rudolph C: Classifying complex pediatric feeding disorders. *J Pediatr Gastroenterol Nutr* 1998;27:143–147.
- 7 Zero to Three: Diagnostic Classification of Mental Health and Developmental Disorders of Infancy and Early Childhood, Revised Edition (DC: 0–3R). Washington, Zero to Three, 2005.
- 8 Levy Y, Levy A, Zangen T, Kornfeld L, Dalal I, Samuel E, et al: Diagnostic clues for identification of nonorganic vs organic causes of food refusal and poor feeding. *J Pediatr Gastroenterol Nutr* 2009;48:355–362.
- 9 Kerzner B, Milano K, MacLean WC, Berall G, Stuart S, Chatoor I: A practical approach to classifying and managing feeding difficulties. *Pediatrics* 2015;135:344–353.
- 10 American Psychiatric Association: Diagnostic and Statistical Manual of Mental Disorders, 5th Edition: DSM-5. Washington, American Psychiatric Association, 2013.
- 11 Dovey TM, Staples PA, Gibson EL, Halford JCG: Food neophobia and ‘picky/fussy’ eating in children: a review. *Appetite* 2008;50: 181–193.
- 12 Wu YP, Franciosi JP, Rothenberg ME, Hommel KA: Behavioral feeding problems and parenting stress in eosinophilic gastrointestinal disorders in children. *Pediatr Allergy Immunol* 2012;23:730–735.
- 13 Vaquero-Sosa E, Francisco-González L, Bodas-Pinedo A, Urbasos-Garzón C, Ruiz-de-León-San-Juan A: Oropharyngeal dysphagia, an underestimated disorder in pediatrics. *Rev Esp Enferm Dig* 2015;107:113–115.
- 14 Prasse JE, Kikano GE: An overview of pediatric dysphagia. *Clin Pediatr (Phila)* 2009;48: 247–251.
- 15 Sullivan PB: Gastrointestinal disorders in children with neurodevelopmental disabilities. *Dev Disabil Res Rev* 2008;14:128–136.
- 16 Arvedson JC: Feeding children with CP and swallowing difficulties. *Eur J Clin Nutr* 2013; 67(suppl 2):S9–S12.
- 17 Noimark L, Cox HE: Nutritional problems related to food allergy in childhood. *Pediatr Allergy Immunol* 2008;19:188–195.
- 18 Singendonk MMJ, Rommel N, Omari TI, Benninga MA, van Wijk MP: Upper gastrointestinal motility: prenatal development and problems in infancy. *Nat Rev Gastroenterol Hepatol* 2014;11:545–555.
- 19 Evans S, Alroqaiba N, Daly A, Neville C, Davies P, Macdonald A: Feeding difficulties in children with inherited metabolic disorders: a pilot study. *J Hum Nutr Diet* 2012;25:209–216.
- 20 Abadie V, Couly G: Congenital feeding and swallowing disorders. *Handb Clin Neurol* 2013;113:1539–1549.
- 21 Tolia V: Very early onset nonorganic failure to thrive in infants. *J Pediatr Gastroenterol Nutr* 1995;20:73–80.
- 22 Hubbard KL, Anderson SE, Curtin C, Must A, Bandini LG: A comparison of food refusal related to characteristics of food in children with autism spectrum disorder and typically developing children. *J Acad Nutr Diet* 2014; 114:1981–1987.
- 23 Shields B, Wacogne I, Wright CM: Weight faltering and failure to thrive in infancy and early childhood. *BMJ* 2012;345:e5931.
- 24 Arvedson JC: Assessment of pediatric dysphagia and feeding disorders: clinical and instrumental approaches. *Dev Disabil Res Rev* 2008;14:118–127.
- 25 Fischer E, Silverman A: Behavioral conceptualization, assessment, and treatment of pediatric feeding disorders. *Semin Speech Lang* 2007;28:223–231.
- 26 Howe T-H, Wang T-N: Systematic review of interventions used in or relevant to occupational therapy for children with feeding difficulties ages birth–5 years. *Am J Occup Ther* 2013;67:405–412.
- 27 Ammaniti M, Lucarelli L, Cimino S, D’Olimpio F, Chatoor I: Feeding disorders of infancy: a longitudinal study to middle childhood. *Int J Eat Disord* 2012;45:272–280.