



# How to approach feeding difficulties in young children

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Feeding is an interaction between a child and caregiver, and feeding difficulty is an umbrella term encompassing all feeding problems, regardless of etiology, severity, or consequences, while feeding disorder refers to an inability or refusal to eat sufficient quantities or variety of food to maintain adequate nutritional status, leading to substantial consequences, including malnutrition, impaired growth, and possible neurocognitive dysfunction. There are 6 representative feeding disorder subtypes in young children: infantile anorexia, sensory food aversion, reciprocity, posttraumatic type, state regulation, and feeding disorders associated with concurrent medical conditions. Most feeding difficulties are nonorganic and without any underlying medical condition, but organic causes should also be excluded from the beginning, through thorough history taking and physical examination, based on red-flag symptoms and signs. Age-appropriate feeding principles may support effective treatment of feeding difficulties in practice, and systematic approaches for feeding difficulties in young children, based on each subtype, may be beneficial.

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## Introduction

Feeding is an interaction between a child and caregiver, while eating comprises actions regarding nutritional intake via mouth that are performed only by a child<sup>1</sup>. Nutritional intake is an important issue in infancy and early childhood because these periods are regarded as critical windows for physical growth and neurodevelopment, which can affect long-term outcomes if not treated properly. The feeding process of young children is mainly dependent on their parents or caregivers. According to previous reports, about 20%–30% of infants and toddlers tend to have feeding-related problems, which increase the risk of nutritional imbalance and failure to grow<sup>2</sup>. Infants and toddlers with feeding problems are usually referred to pediatric outpatient clinics for the evaluation of problematic feeding difficulties or growth faltering resulting from persistent inadequate intake<sup>3</sup>. Therefore, a systematic approach to the evaluation and management of feeding difficulties in young children is critical for pediatricians in clinical practice.

## Definition of feeding difficulties and feeding disorders in children

Feeding difficulty is an umbrella term encompassing all feeding problems, regardless of etiology, severity, or consequences<sup>4</sup>. It includes any problems that affect the process of providing food to the child. Feeding difficulties in children manifest as prolonged mealtimes, food

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refusal, disruptive and stressful mealtimes, lack of appropriate independent feeding, nocturnal eating in infants and toddlers, introduction of distractions to increase intake, prolonged breast- or bottle feeding in toddlers and older children, or failure to introduce advanced textures<sup>4</sup>. Feeding difficulties are usually classified into three principal categories as suggested by Kerzner et al.<sup>4</sup>: (1) limited appetite, (2) selective intake, and (3) fear of feeding. All of these categories have subtypes, including misperceived feeding problems, as well as organic and nonorganic feeding difficulties.

Feeding difficulties encompass all spectrums of feeding problems, ranging from a mild form of picky eating to a severe form of food refusal observed in children with autistic spectrum disorders, which requires a multidisciplinary feeding-team approach. According to Kerzner et al.<sup>4</sup>, about 25% of parents complain that their children have feeding-related problems. However, most of these problems are either misperceived feeding problems or a mild form of feeding difficulty, and only 1%–5% of young children seem to have problematic feeding disorders.

Feeding disorder is defined as difficulty in consuming an adequate amount or variety of food, that is, an inability or refusal to eat and drink sufficient quantities of food to maintain an adequate nutritional status. Therefore, feeding disorders may lead to substantial organic, nutritional, or emotional consequences including impaired growth.

Feeding disorder of infancy or early childhood is a more specific formal diagnostic term regarding pathologic feeding-related issues<sup>5</sup>. At present, by definition, the diagnosis of feeding disorder requires the identification of food refusal, together with growth faltering after the exclusion of organic causes for the symptoms, and the Diagnostic and Statistical Manual of Mental Disorders (DSM) referred to feeding disorder as a persistent feeding impairment and either a failure to gain weight or a significant weight loss for at least 1 month, without a lack of available food or significant medical conditions<sup>6</sup>.

## Diagnostic criteria and classification of feeding disorders in children

There are several diagnostic criteria for the clinical diagnosis and classification of childhood feeding disorders. The diagnostic criteria in the DSM-IV, from the psychiatric field, focus more on behavioral problems: (1) persistent failure to eat adequately as reflected in significant failure to gain weight or weight loss >1 month; (2) the disturbance is not due to gastrointestinal diseases or other medical conditions such as gastroesophageal reflux disease; (3) the disturbance is not better explained by other mental disorders, such as rumination disorder, or by a lack of available food; and (4) the age of onset must be <6 years<sup>6</sup>.

Recently, the diagnostic criteria in the DSM-V revised early childhood feeding disorders under the umbrella term of avoidant restrictive food intake disorder (ARFID) because feeding disorders, formerly diagnosed in infants and children, were recognized even beyond early childhood<sup>7</sup>. According to the DSM-V, ARFID is defined as follows: (1) a 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, and significant psychosocial interference; (2) the disturbance is not due to limitations in food availability; (3) the disturbance is not due to anorexia nervosa or bulimia nervosa; and (4) the disturbance is not explained by other medical conditions or mental disorders, or is not occurring concurrently with another condition<sup>7</sup>.

The Wolfson criteria, which are more commonly used in practice, include all of the following: (1) persistent food refusal lasting >1 month, (2) the absence of obvious organic disease leading to food refusal or lack of response to medical treatment of an organic disease, (3) age of onset <2 years or age at presentation <6 years, and (4) the presence of at least one of pathological feeding or anticipatory gagging<sup>8–10</sup>. According to Levine et al.<sup>10</sup>, pathologic feeding behaviors for the diagnosis of feeding disorders include nocturnal feeding (e.g., feeding an infant while sleeping because the child refuses food intake while awake), persecutory feeding (e.g., constant attempts to feed a child by overriding refusal or frequent consecutive attempts to offer food even though the baby refuses to eat), forced feeding (e.g., feeding a child forcefully by opening the child's mouth), mechanistic feeding (e.g., feeding a child precisely at regularly scheduled times with a given exact amount of food or formula at every meal, irrespective of hunger cues), and conditional distraction (e.g., the child will not eat without a distraction, such as TV, video, or toys, and is not interested in food)<sup>10</sup>. The Wolfson criteria proposes the subtypes of feeding disorders as mechanistic feeding, transitional feeding, posttraumatic feeding, size, organic, and unclassified types<sup>10</sup>.

Chatoor classification and its diagnostic criteria are more commonly used in practice to treat young children with feeding problems. According to Chatoor classification and diagnostic criteria, feeding disorders are classified into 6 subtypes: infantile anorexia, sensory food aversion, feeding disorder of reciprocity, posttraumatic feeding disorder (e.g., fear of feeding), and feeding disorder associated with concurrent medical conditions, in addition to feeding disorder of state regulation in early infancy<sup>10</sup>. Each of these feeding disorder subtypes has definitive diagnostic criteria.

The infantile anorexia type of feeding disorder is defined as follows: (1) child refuses to eat adequate amount of food for >1 month, (2) the onset usually occurs between 6 months and 3 years of age during the transition to spoon and self-feeding, (3) child does not express hunger and lacks interest in food and shows strong interest in exploration instead, (4) child shows significant growth faltering;

(5) food refusal does not follow a traumatic event, and (6) food refusal is not caused by an underlying medical illness<sup>10,11</sup>.

Sensory food aversion is described as follows: (1) child refuses to eat specific foods with specific tastes, textures, smells, or appearances; (2) the onset occurs during the introduction of a different type of food; (3) child eats better and more when offered preferred foods; and (4) child has specific nutritional deficiencies or oral motor delay<sup>10,11</sup>. Children with this type of feeding disorder have a tendency of picky eating. For example, they may eat crunchy foods, but refuse liquid food; they may eat carrots, but refuse spinach.

Detection and diagnosis of the reciprocity type of feeding disorder may be somewhat difficult, but are still important. Diagnostic criteria for feeding disorder of reciprocity (neglect) comprise: (1) child lacks developmentally appropriate signs of social relatedness including visual engagement, social smile, and babbling during feeding with a caregiver; (2) a baby has significant growth faltering; (3) growth failure and lack of relatedness are not merely caused by organic medical conditions or a pervasive developmental disorder<sup>10,11</sup>.

Diagnostic criteria for posttraumatic feeding disorder, known as the fear of feeding type, involve: (1) food refusal that follows a traumatic event or repeated traumatic insults to the oropharynx or gastrointestinal tract that trigger intense distress in an infant, such as choking, severe vomiting, insertion of nasogastric or endotracheal tubes, or repeated suctioning; (2) consistent refusal to eat, manifesting in one of the following ways: child refuses to drink from the bottle when awake, but accepts food offered by spoon and drinks from the bottle when asleep; child refuses solid food, but accepts bottle feeding; or child refuses all types of oral feeding<sup>10,11</sup>. There are some cues indicative of fear of feeding, including anticipatory distress when positioned for feeding, intense resistance when approached with the bottle or food, and intense resistance to swallowing when food is placed in mouth<sup>10,11</sup>.

Feeding disorder of state regulation in early infancy may be similar to infantile colic. Infants experience difficulties in reaching and maintaining a calm state during feeding, this type of feeding difficulty starts in the newborn period, and infants may fail to gain adequate weight or even lose weight<sup>10,11</sup>.

Feeding disorder associated with a concurrent medical condition is suggested when a child readily initiates feeding, but shows distress during the course of feeding and refuses to continue feeding<sup>10,11</sup>. Medical management for the underlying medical condition, such as gastroesophageal reflux disease, may improve the disorder with proper treatment, but does not fully solve the feeding problem itself.

According to a recent report, the most prevalent type of feeding disorder was infantile anorexia (55.4%), followed by organic feeding disorder (16.9%), posttraumatic type (12.3%), reciprocity type (9.2%), and sensory food aversion and state regulation type of feeding disorders (3.1% each)<sup>10,11</sup>. Each type of feeding disorder can affect appetite and disturb adequate oral intake. Thus, feeding disorders in early childhood may be an important health issue since they result

in short-term nutritional deficiency and weight loss and long-term deficits in growth, cognitive function, and neurodevelopment<sup>12</sup>. Persistent inadequate caloric intake caused by feeding disorders leads to nonorganic failure to thrive in 40%–50% of affected children<sup>2</sup>.

## Prevalence of feeding difficulties in young children

The prevalence of feeding difficulties is approximately 25%–35% in children with normal intellectual and adaptive development<sup>4</sup>. For those with developmental disabilities, prevalence increases to 40%–80%. In particular, the prevalence of feeding difficulties is almost 90% in children with autistic spectrum disorders<sup>13</sup>.

There is a lack of data for the prevalence of feeding disorders in Korean children. According to a parental survey reported in 2008, the prevalence of feeding problems was 41.1% in children aged 1 to 12 years<sup>14</sup>. This survey reported that picky eating was the most prevalent feeding-related problem (81.7%), followed by prolonged mealtimes (43.1%)<sup>14</sup>.

Because feeding difficulty is associated with nutritional deficiency and growth faltering, its prevalence may be higher in children with failure to thrive than in the general population, and the data from our tertiary medical center revealed that feeding difficulties were reported in 76.5% of Korean children with nonorganic failure to thrive; the infantile anorexia type of feeding disorder was the most prevalent, followed by sensory food aversion<sup>15</sup>.

## Clinical approach to feeding difficulties in children

The first step for treating a child who is suspected of feeding difficulties starts with thorough history taking, including dietary history and feeding-related behaviors. Feeding difficulties can be suspected when a child shows one or more of the following symptoms and signs: food refusal lasting more than 1 month, prolonged mealtimes, stressful mealtimes, distractions to increase intake, lack of appropriate independent feeding, prolonged breast or bottle feeding, nocturnal feeding, and failure to progress to advanced textures<sup>4</sup>. To screen for and detect feeding problems, thorough history taking and standardized questionnaires for parents or caregivers, physical examination to detect signs of underlying organic diseases or malnutrition, as well as anthropometric measurement, including body weight, height, and head circumference, may all be helpful in practice. Examples of questions for pediatricians to screen and evaluate feeding-related problems are shown in Table 1.

The next step may be the differentiation between underlying organic and nonorganic causes of feeding problems<sup>7</sup>. According to Kerzner et al.<sup>4</sup>, there are some noticeable “red flags” indicative of organic feeding disorders. These red flags, in addition to basic information on children’s feeding behaviors, are key points in treating

**Table 1.** Examples of questions to screen and assess feeding-related problems in practice

Question
Key questions
Are there any feeding-related problems in your child?
How the feeding problem manifest during mealtime?
Does the child have any underlying disease that affects oral intake?
Have the child's growth and development been faltered and retarded?
How is the child's response to food and the interaction between the caregiver and the child during the mealtime?
How is the caregiver's response when the child refuses to eat?
Are there any significant stress factors in the family that influences oral intake of the child?
Questions on feeding history
When dose the child eat? Where? With whom?
How does the child eat? Self-feeding with good appetite?
How is the positioning of the child during mealtime?
Are there any distractions such as television viewing, games, and toys that disturb eating during the mealtime?
Are there any feeding battles between the child and the caregiver?
Does the child have the tendency of selective eating during the mealtime?
Does the child show fear of feeding or depressed mood during the mealtime?
Questions on dietary history
What and how often does the child eat? (Use a 24-hour recall record on 1-day log of all foods given and fed)
How much is the amount of food and/or formula?
How do you prepare food and/or the formula for the child?
Is there excessive beverage consumption such as milk, juice, sodas, and water?
What specific foods with specific tastes, textures, smells, or appearances does the child refuse to eat?
What and how often does the child eat snack between the meals?

young children with feeding difficulties. The red flags, based on symptoms and signs, include dysphagia, choking and aspiration, odynophagia or excessive crying and pain on feeding, frequent vomiting, profuse diarrhea, developmental delay, chronic cardiac or respiratory symptoms, skin eczema, growth faltering or weight loss, prematurity, congenital anomalies, and features of autism<sup>4)</sup>. Children born as preterm infants and those with neurological impairment or with inborn errors of metabolism are at high risk for organic feeding disorders, requiring thorough investigation and proper management.

No laboratory investigations are routinely required in children with normal physical and neurological examination results, normal growth patterns on standardized growth curves, and normal developmental milestones. Laboratory tests, such as complete blood count (white blood cell counts, lymphocyte counts, hemoglobin, and hematocrit levels), chemistry (serum protein and albumin, iron, iron-binding capacity, ferritin, liver panel, and renal panel), inflammatory markers (erythrocyte sedimentation rate and C-reactive protein), and urinalysis, are often beneficial for children with red flags to screen for concurrent infections and underlying medical conditions<sup>16)</sup>.

If organic diseases are suspected, underlying medical conditions should be treated first. This is why the role of pediatricians is critical in assessing and managing infants and young children with feeding

difficulties. If feeding problems persist, even after organic diseases have been cured medically, or there is no evidence of organic causes for feeding difficulties, the nature and subtypes of all feeding difficulties should be determined promptly and managed specifically, based on detailed information for feeding behaviors and parent-child relationships.

### Feeding guidelines for children with feeding difficulties

The following basic feeding principles for children with feeding difficulties have been suggested: (1) maintain appropriate boundaries; (2) avoid all kinds of distraction (e.g., television viewing, games, cell phones, toys, and books) or noise and use a child-size chair at the table; (3) feed the child at intervals of 3–4 hours to encourage and maximize appetite and avoid snacks and beverages between meals; (4) maintain a pleasant neutral attitude with a smiling face throughout meals and never become anxious, angry, or excited; (5) limit mealtime duration to no longer than 20–30 minutes; (6) serve age-appropriate food according to the child's oral motor development and use reasonably small helping sizes; (7) systematically introduce a new food one at a time and step by step, and

offer a food repetitively, at least 5 to 15 times, before giving up; (8) encourage independent feeding in a toddlers, ensuring they have their own spoon; and (9) allow age-appropriate messes during meal-times by using a bib and not wiping the mouth with a napkin every time a child eats or drinks<sup>4,17</sup>.

Specified systematic approaches to infants and toddlers with feeding difficulties, according to each subtype, may be also beneficial in practice. For a child with infantile anorexia type who has little interest in food, the first treatment strategy can be designed to enhance hunger cues and satiety and to increase appetite for subsequent satisfaction from feeding or eating. Such feeding strategies for infantile anorexia type are as follows: (1) ensure 3 mealtimes and an afternoon snack with more than 3-hour intervals in between, (2) begin eating within 15 minutes after food is introduced and limit total meal duration to 20–30 minutes, (3) remove food if the child does not start or finish within a reasonable time, (4) do not offer juice or snacks and only allow water in between meals, and (5) encourage self-feeding. The second strategy is to minimize or avoid distractions during feeding and use timeout to discourage disruptive behavior and undesirable habits<sup>17</sup>.

For the reciprocity type of feeding disorder in an apathetic and depressed child, close observation of the child and provision of proper parent-child interaction are critical. These children may also have little interest in eating and the environment and they do not exhibit eye contact, smiling, or babbling during feeding. This type of feeding disorder may result in substantial undernutrition and weight loss, leading to growth faltering, and it may threaten the children's health status. Emotional support for mothers and specialized treatment for maternal psychiatric problems, such as depression, may be helpful. Inpatient admission may also be beneficial to provide children with positive feeding environments and interactions<sup>17</sup>.

The sensory food aversion type requires somewhat different treatment strategies. At first, "food neophobia," which is a normal resistance to the introduction of new food in a healthy child, should be distinguished from true sensory food aversion or selective picky eating. Children with sensory food aversion tend to refuse to eat foods because of their taste, texture, smell, temperature, or appearance, and also tend to have additional sensory problems, including adverse responses to textures, lights, and noises<sup>4,17</sup>. For children with a mild degree of selective and picky eating, simple feeding techniques (e.g., substitutional food provision by hiding food in sauces or using attractive designs) and the basic feeding principles described above may be helpful to correct picky eating behaviors. For highly selective children, long-lasting intense systematic and stepwise approaches (e.g., offering a desired food on the progressive acceptance of less desired foods, food chaining by replacing one food with a similar one, fading and shaping of taste, color, texture, and gradual exposure to the food) in conjunction with positive reinforcement are required<sup>4</sup>. In children with neurological impairment or with developmental oral motor delays, oromotor

therapy by a speech and language therapist may be beneficial. Children with autistic spectrum disorders are at high risk of feeding difficulties, mainly selective eating, and require a specialized multidisciplinary feeding-team approach for nutritional support, coupled with sensory integration therapies (e.g., tactile stimulation, oral motor desensitization, and shaping and fading)<sup>4</sup>.

Posttraumatic feeding disorder or fear of feeding develops after single or repeated aversive experiences related to ongoing or previous feeding, such as choking, vomiting, and nasogastric tube feeding. Treatment strategies for this type of feeding difficulty aim to reduce preceding feeding-related anxiety. At first, the cause of pain should be eliminated so that the pain is resolved. Then, an individualized approach that applies deconditioning techniques (e.g., feeding while asleep and proper sleep-feeding schedules) or involves early transition to cup or early introduction of weaning foods may be helpful to relieve anxiety and fear in babies. In older children, reassurance and positive reinforcement with rewards to overcome fear of feeding is important, and the use of anxiolytic medication and cognitive behavioral therapy under the supervision of a psychiatrist may also be beneficial in some children<sup>4</sup>.

## Conclusions

Feeding difficulties are very common health problems in childhood, especially in infants and toddlers. Although the majority of feeding difficulties are caused by nonorganic etiologies, underlying organic causes should also be thoroughly ruled out in children with red flag symptoms and signs through thorough history taking and physical examination, especially in young children with growth faltering. Age-appropriate feeding principles may support effective treatment for feeding difficulties in practice, and systematic approaches to feeding difficulties in young children, based on each subtype, may be useful. As persistent feeding difficulties may lead to nutritional deficiency and growth faltering, pediatricians should be aware of proper nutritional support and feeding strategies in practice, which may improve clinical outcomes of young children with feeding difficulties.

## Conflicts of interest

No potential conflict of interest relevant to this article was reported.

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