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1 Learning from the Best: Will Wonders Never Cease?

Your clinical experience likely confirms that there are two periods of great stress for parents and their children during the transition to table foods. Our recent experience with experts who specialize in infants and young children with physical and sensory disabilities broadened our perspective on infant feeding by offering bits of wisdom that parents of all children could benefit from.

Kath Ferguson
Vice President of Product Development and Nutritional Sciences
Gerber Products Company

2 Feeding Strategies for Older Infants and Toddlers

It’s important for parents to establish a feeding plan early on that will help their older infant and toddler master the incremental skills needed to transition from pureed baby foods to textured table foods. Educating parents about the complexity of the learning to eat process empowers them and helps them realize that there are things they can do to make the feeding experience go better for both their child and themselves.

Kay Toomey, PhD
Director
Colorado Pediatric Therapy and Feeding Specialists, Inc
Denver, Colorado

14 Feeding Problems During Weaning and Beyond

Children with eating impairments that involve oral-motor skills (dysphagia) are at risk of life-long feeding problems. They are typically children born prematurely, with failure-to-thrive, genetic syndromes, oral apraxias, encephalopathies, traumatic brain injury or developmental delay. Recognition of the symptoms and classification of the nature of the problem will allow the pediatrician to take the necessary steps to ensure that the family receives the care and follow-up needed.

Erika G. Gisel, PhD, OTR, erg
Professor, School of Physical & Occupational Therapy, McGill University
Director, Swallowing and Dysphagia Clinic, Montreal Children's Hospital
Montreal, Quebec
Learning from the Best
Will Wonders Never Cease?

For 75 years, Gerber has been the industry leader in infant food and feeding, relying on scientific research, the expertise of our own nutrition and food science teams, as well as national and international experts in infant nutrition and feeding. Continuous feedback from moms “in the field” through consumer testing, focus groups and our 800 number has allowed us to develop a wide variety of products that are “baby tested, mom approved.” Our aim has always been to make the feeding experience enjoyable for both baby and caregiver by matching our products to the developmental capabilities and needs of the normally developing child, who moves through the traditional developmental milestones in an orderly progression.

Another Set of Eyes
Recently, we had an opportunity to tap into the wisdom of feeding experts who specialize in infants and young children with physical and sensory disabilities. This enlightening experience seemed to open a window and broaden our perspective on infant feeding by offering bits of wisdom that parents of all children could benefit from.

For example, we learned that eating is not instinctual after the early months of infancy, as many people often believe. Children must learn feeding skills during an education process that occurs over many months of practice, trial and error. While parents do play a key role in helping their children learn those skills, the learning and teaching is reciprocal between parent and child. Together they navigate the transition from an all-milk diet to one that includes a variety of healthy foods.

We also confirmed some core beliefs, like how babies have an amazing way of finding solutions to solve their own problems. They suck their thumbs to calm themselves. They will place their finger or fist in their mouth to promote sucking. They know when they have had enough to eat. We all need to pay attention to the lessons that these tiny teachers have to offer.

Our conversations also confirmed that sensory stimulation is critical to an infant’s normal growth and development. Sensory stimulation covers a lot of areas, from textured toys, to the colors in the playpen, to the foods offered at mealtimes — their flavor notes (bitter, sour, sweet), color, temperature, and texture. Free exploration during feeding facilitates sensory learning.

Through our years of experience we have learned that if parents can offer the right foods at the right time, i.e., when their babies are ready to learn new feeding skills, the process is much easier, less stressful, and more fun and enjoyable for all concerned. The food is a tool that the infant can use to learn and practice new skills on, if the food’s size, shape and texture meet the infant’s developmental abilities.

A Message for All Parents
As pediatric professionals, your clinical experience likely confirms that the two periods of greatest stress for parents and their children during the transition to table foods are initially, when a child first learns to eat cereal from a spoon, and later, when a child makes the transition from purees to foods with particulates. While it is true most normally developing children eventually master their feeding difficulties, the wait-and-see approach provides little comfort to frustrated parents in the throes of daily mealtime battles. This issue of Pediatric Basics features articles by infant feeding specialists Kay Toomey, Ph.D. and Erika Gisel, Ph.D., who offer an in-depth look at how older infants and toddlers learn to eat and practical suggestions for parents struggling with difficult and problem feeders.

At Gerber, we believe that learning to eat should be a natural, stress-free progression for families with young children. With the right foods, at the right time, it can be a pleasant and fun experience too.
Feeding Strategies for Older Infants and Toddlers

Synopsis — Eating is the most complex physical task humans engage in. It is the only physical task that utilizes all of the body’s organ systems, which is why it is important for parents to establish a feeding plan early on that will help their older infant and toddler master the incremental skills needed to transition from pureed baby foods to textured table foods. The skills needed for successful feeding include: postural stability, oral-motor skills, jaw skills, sensory skills, hand-to-mouth skills, and parenting skills.

Parental stress around feeding can be greatly alleviated through guidance by a pediatric practitioner who can educate them about the complexity of the learning to eat process. This education empowers parents and helps them realize that there are things they can do to make the feeding experience go better for both their child and themselves.
foods with textures can be properly broken apart; 4) sensory skills, which allow the older infant and toddler to tolerate the “feel” of foods in their mouth, to learn to like the taste of table foods, and to track where the food is in the mouth at any given time; 5) hand-to-mouth skills, which allow the child to learn to self feed; and 6) parenting skills, which encourage the infant to enjoy a variety of foods and the feeding experience throughout the formative years.

Postural Stability
As with the younger infant just learning to eat baby cereal, the ability to sit upright independently is critical for transitioning on to more difficult-to-manage foods. Once a child is able to sit independently without falling over for approximately 10 minutes, it’s time to make the transition from an infant feeding seat to a standard high chair. This usually takes place somewhere between 8-9 months of age for most children. Today’s new high chairs frequently have good side and front supports, often with a saddle bar in the center to prevent the older infant from sliding forward out of the chair. If the family does not have this type of high chair, a non-skid mat under the rear end and a foam insert called a “High Chair Helper” can provide the same level of support and secure sitting.

As the older infant grows into a toddler, parents will notice their child’s increased interest in sitting at the table with the rest of the family, usually around 18 months of age. Since this is also an age when children become very interested in imitating others, it is important to have meals at a family table where the child can closely watch the family eating. While keeping toddlers in high chairs may keep them contained (somewhat), it also perpetuates physical separation from the family and doesn’t allow them to see well enough to learn by imitation. Ideally, the family will use a height-adjustable high-chair which can be pushed up to the family table with the tray removed. This will allow the inquisitive and active toddler to remain in a stable seat, while still joining the family.

Oral-motor Skills
The oral-motor skills needed for transitioning to finger foods and table foods are different from those used for breast/bottle feeding and spoon-feeding. Breast/bottle feeding predominantly involves forward/backward tongue movements. Spoon-feeding skills develop over time from a normal tongue thrust to tongue “waves” that transfer foods from front to back of the mouth, after about a month of practicing with the spoon. Between 7-9 months, the infant learns to cup the tongue for the spoon, and close their lips around the spoon to help draw the food into the mouth. If the high chair is not adjustable, a booster seat, with very high side arms and a stable back, should be used. The booster seat will need to be securely attached to the front edge of the adult chair so that the toddler’s legs are in a 90 degree position with the feet supported by a foot rest. Sliding a booster seat to the back of an adult’s chair will cause the child’s legs to stick out under the table at an odd angle, and does not permit stable seating. The lack of a stable seating arrangement is the most common clinical reason for toddlers to repeatedly get in and out of their chairs during meals. Running away from the table during meals does not support good eating habits.

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Preventing and Treating “Food Jags”

Even the typically developing child can become a picky eater when allowed to food jag. This is because if children are only exposed to the same few foods every day, they do not learn how to manage the complex sensory information needed to eat difficult foods, such as raw vegetables, hard-to-chew meats, or wet/slippery fruits. The infant who once ate all types of fruits and vegetables as a pureed baby food doesn’t learn how to eat the table food versions. Or, the toddler who has become neophobic of every green food is no longer given the sensory practice of eating peas because the child is tantruming.

The key here is to back down the sensory progression of learning about foods on the “Steps to Eating Hierarchy” to a level the toddler can tolerate. This means that a toddler may need to back down from actually eating peas to just squishing them for a while to become reacquainted with their sensory qualities. Gradually, the parent can move their child back up the sensory steps towards eating.

To move a child up the sensory hierarchy, the parent needs to create “play with a purpose”, with the purpose being to move the child up to the next sensory step in the progression. For example, for an older infant or toddler who does not want to even look at the food, making it wiggle in front of them can often times attract their attention. Pretending the food is an animal coming to talk to them is also engaging. Stirring, pouring and dumping from a spoon are all good (and fun) ways to encourage a child to interact with food. Having an older child help with food preparation is also an excellent way to move up to interacting with the foods while achieving the smell step of the hierarchy. Breaking, pulling, waving and crushing the foods are all excellent strategies for teaching a child about how the food will move once it is in their mouth, as well as moving them up to the touch step of the hierarchy. Blowing “rockets” into a cup – or better yet into the trash – is the easiest way to get children to taste a food they otherwise would not go near. Remember, playing with the food is not the end goal of this process. These are merely more manageable steps along the way to actually eating the food.

Parents can prevent food jags in the first place by changing some physical property about the preferred food EVERY time it is presented. This means that the size, shape, color, texture, temperature or taste will need to be different each time the child is given their food jag food. For example, for the child who will only eat macaroni and cheese from a blue box, begin by putting the raw ingredients in a plain, sealed plastic bag or bowl first. Next, offer the child the preferred noodle shape with the pieces cut in half, then change to a different shaped noodle for several exposures.

By this time the child should be able to tolerate the different flavor of the macaroni and cheese created by adding Parmasean cheese to the mix. Finally, parents can change the color of the macaroni and cheese mixture by adding a small amount of food coloring.

Many parents and professionals treat food jags as a normal toddler behavior that can be tolerated. While the appearance of the pattern may be normal, maintaining it is not and will only serve to limit a child’s exposure to a variety of other foods, reinforcing the child’s preference for a very limited number of foods.

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**Steps to Eating Hierarchy**

1. Visually tolerating the food
2. Interacting with the food without actually touching it (vestibular; kinesthetic and proprioceptive systems)
3. Smelling
4. Touching
5. Tasting and then, finally
6. Eating

*In order of most basic to most difficult.*

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If children are only exposed to the same few foods every day, they do not learn how to manage the complex sensory information needed to eat difficult foods, such as raw vegetables, hard-to-chew meats, or wet/slippery fruits.
ment, is critical for successfully transitioning from baby food purees to table foods. A controlled “lateral tongue movement pattern” is learned in developmental stages that begin with learning to tolerate the feel of a long hard object in the mouth. The mouthing of teething toys and other developmentally appropriate objects of different textures helps infants and toddlers learn to manage the feeling of objects in their mouth and teaches them how to move their tongue from side to side. Initially, the hands help move the foods around in the mouth. Over time and with practice, the “lateral tongue reflex” comes under voluntary control and food is moved around without as much assistance from the hands. Typically, this skill develops around 8-9 months of age. Older infants who have mastered lateral tongue movements are ready to try age-appropriate finger foods.

It is important to recognize that, in order to correctly manage textured table food from an oral-motor standpoint, lateral tongue movements must be learned first. When older infants are given pureed baby foods that have chunks of other foods in them before they learn how to lateralize their tongue, the chunk of food may become stuck on the top of the tongue and cause the child to gag. (You can find out just how uncomfortable this feels, as well as come to a better understanding of the oral mechanics of eating textured foods, by conducting the experiment on page 6.) Infants and toddlers who frequently gag on food learn that eating is not a pleasant experience and, consequently, may avoid textured foods or avoid food altogether.

The oral-motor skills necessary for cup drinking are also quite different from those used with breast and bottle feeding. Most importantly, the older infant needs to learn how to hold a small amount of fluid in the mouth, and to pull it into a ball (or bolus) for swallowing. Cups with no-spill valves perpetuate a bottle/breast drinking oral pattern in which the fluid is sucked back using negative pressure with the tongue flat held underneath a spout (or nipple) and do not support the development of the more mature drinking skills. An open cup or sipper cup without a no-spill valve is a more appropriate first cup choice. Ideally, the cup would have two handles and a recessed lid so the older infant can easily hold and manipulate the cup, as well as avoid compressing the nose against the lid.

Jaw Skills

As previously noted, breast/bottle-fed infants primarily use their tongue for feeding. While there is some jaw movement involved in both early fluid feeding (compression movements) and spoon feeding (open and close), the role of the jaw and chewing is small compared to that of the tongue. Between 9 and 10 months of age, the jaw becomes very active in eating as the child learns to break food apart by moving the jaw up and down with pressure on the food. An up and down jaw movement is referred to as a “munch.”

Rotary chewing emerges between 12 and 14 months of age as the toddler encounters more chewy textured foods. Appropriately sized and shaped, soft table foods can be introduced once a child adds a small grind with the teeth on the food, along with a small side-to-side motion of the jaw (rotary chew).

Sensory Skills

Eating requires the simultaneous integration of all eight of our sensory systems. These senses include the five which are well known: seeing, hearing, tasting, touching and smelling, as well as the lesser-known senses of balance, awareness of body in space and information received from one’s joints. The latter three sensory systems are known as the vestibular, kinesthetic and proprioceptive systems respectively. Once an infant is sitting independently, these three sensory systems start to play a very large role in feeding.

Another one of the myths about feeding is that eating is our body’s first priority, when actually it is only the third. Breathing is the body’s number one priority and...
balance is the second. As such, the vestibular/balance system becomes very important when the infant is no longer held by an adult who is providing balance. In addition, every time humans move their heads, the fluid in our inner ear shifts and the vestibular system must readjust our sense of balance. In order to spoon feed, the older infant needs to come to midline and open their mouth; a task which shifts the head in space and requires an adjustment in balance. Chewing table foods is an even more difficult task as humans do not naturally chew with their heads perfectly still. Young toddlers especially move their head with every chewing motion, and therefore have to readjust their sense of balance with each munch or chew that they make.

With regard to kinesthesia, drinking from a nipple does not require much body awareness since the nipple fills up much of the mouth. A puree coats the inside of the mouth and is not difficult to locate from a body awareness standpoint either. However, a small piece of table food can be easily lost in the mouth if there is not good body awareness. Older infants and toddlers need to be able to track each piece of food in their mouth so they do not accidentally bite their tongue or cheek instead of the food. In addition, the food must be followed inside the mouth to know that it has been placed correctly onto the molars, and where it is located when it is time to swallow. You have experienced a kinesthetic awareness problem if you have ever eaten popcorn and ended up with a popcorn shell stuck in the back of your throat. Your sensory system lost track of the location of that shell and it ended up in a place it did not belong.

During feeding, information received from the jaw joint via the proprioceptive system is also different depending on whether the infant is drinking a fluid, sucking back a puree, or chewing table foods. Remember, drinking is actually more of a tongue than a jaw movement, and spoon-feeding requires primarily an open/close motion of the mouth. Chewing, however, is quite complex and gives a large amount of shifting information as a food is broken apart for a swallow. (Think about how different the cracker you chewed in the above experiment felt from the first chew to the last and what kind of jaw pressure differences you registered).

Another very important developmental sensory event that occurs during this time is the change in function of a toddler’s taste buds. Prior to this age, the taste buds on the back of the tongue, soft palate, uvula and back of the throat were primarily used. Shortly after a child’s first birthday, the taste buds on the front of the tongue become predominant and the others decrease in function and/or disappear. As such, the toddler begins to reject baby foods because the taste is no longer preferred. The toddler also becomes resistant to being spoon fed at this age because changes in cognitive and emotional development inspire them to test their independence.

In order to eat textured table foods then, the toddler needs to be able to simultaneously integrate information from all 8 of his sensory systems with every single chewing motion; the sight of the food changes as it is chewed, how it feels changes, what it sounds like in the mouth changes, the taste and the smell actually change, and adjustments need to be made in balance, location of the food, and pressure being exerted. Difficulties with the sensory system is the most common clinical reason for children not being able to transition from baby food purees to textured table foods.

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“Nobody knows the trouble I’m in…” might be the perfect lament of children with feeding disorders. They often struggle along on minimal choices from each food group. They aggravate their parents at every bite; while equally frustrated pediatricians try to reassure parents that “at least your child is growing along a normal curve.” No one may suspect the child is in the early stages of a bonafide feeding disorder, and fewer people know how to identify and correct them.

This occurs because our basic training is excellent in the areas of general nutrition, gross and fine motor development, electrolyte balance, and the recognition of various deficiency states, but is often inadequate in understanding the natural process of learning to eat. Eating is first and foremost experiential, ultimately requiring the integration of a child’s sensory, gross, fine and oral-motor capacities. The accompanying article by Dr. Kay Toomey, details this elegant journey of learned behavior. She provides the “rest of the story” they didn’t tell us in medical school.

It’s easy to appreciate the interdependency of these processes when faced with a disorganized preemie or a child who, for whatever reason, has been fed by a G-tube from an early age. They have to learn or relearn the process, and it is no easy task. At a more subtle level, the same impediments to learning are taking place with our problem eaters. All of us can recognize a child with poor weight gain, ongoing choking, gasping, coughing and vomiting, and the child that arches and cries at each meal. These symptoms prompt early and intense work ups, and usually demonstrate a suspected metabolic disorder, mechanical swallowing difficulty, or GE reflux.

But what about the otherwise normal child who, due to a combination of physical and/or behavioral issues, won’t eat, or will only eat a few foods? To the right are some red flags suggesting early signs of an emerging feeding disorder. The usual cause of each problem follows in parenthesis.

Simple and Effective Office Interventions
Many feeding difficulties can be prevented or treated with a little guidance from you early on. For example:

Rethink your feeding recommendations along developmental rather than nutritional lines. Success with the early feeding of solids is best attained when a child has learned to sit alone. Early on, an infant or swing seat works well. Later, a high chair with a t-strap fastener (or a non-skid pad) and adequate back support is best.

Suggest to parents that initially food should be explored by the senses rather than eaten.

Encourage parents to demonstrate how to eat and explore new foods because babies learn best through imitation. Along those lines, encourage parents to smile when their baby grimaces at a new taste — not imitate their baby’s frown.

Remind parents that it may take 10-20 exposures before a child acquires a taste for a new food. Don’t give up too early.

Instruct parents that the spoon should just touch their child’s lips. The child should be allowed to explore and taste the food, ultimately taking the spoon into the mouth by his own initiative.

Look carefully for signs of sensory problems, such as finger splaying, grimacing, extending legs, and closing their eyes during feeding.

Aversion to loud noises, motion sickness, avoiding climbing stairs, or lack of interest in exploring anything with the mouth can also be signs of sensory problems.

Refer a picky eater — sooner rather than later — to a feeding specialist with OT/ST support, so that the oral-motor sensory dynamics can be fully evaluated and effectively treated.

In summary, don’t be content with the picky eater who consumes a few items from each food group, yet continues to grow at a normal velocity on the curve. There is usually an underlying correctable reason that is worth pursuing. Persistence in your investigation and/or referral can make a world of difference early on in the lives of your patients and their families.

Early Signs of a Feeding Disorder

1. Inability to transition to baby food purees by 10 months (oral-motor/sensory)
2. Inability to accept table foods by 12 months. (oral-motor/sensory)
3. Inability to transition from breast/bottle by 16 months. (lack of proper exposure/oral motor)
4. Inability to wean off baby foods by 16 months. (oral-motor/sensory)
5. Avoidance of foods of specific textures or food groups. (sensory)
6. Parents report that the child is difficult for anyone to feed and meals are a battle zone. (any combination of the above)

Dr. Michael Frank is a pediatrician in private practice in Denver specializing in feeding disorders and ADHD; clinical instructor for The University of Colorado Health Science Center, and Medical Director of the Colorado Pediatric Therapy and Feeding Specialists, Inc.
Hand-to-Mouth Skills
Finger feeding builds on the earlier skills of reaching for and transferring of objects hand-to-hand acquired between four and six months of age. By six months, children have developed a palmar grasp which allows them to rake an object into their palm and hold it up to their mouths. Oral exploration of larger toys and objects really accelerates at this point. Oral and touch exploration of many different types of textures is critical during this time for developing finger feeding skills and interest. Around eight to nine months of age, children gain the ability to pick up small objects using their thumb opposed to their second and third fingers (radial-digital grasp). This allows them to begin to hold on and more efficiently get a hard munchable texture to their mouth for the oral exploration of food tastes. One end of a stick-shaped, hard food can be held in one hand while exploring the other end with the mouth. This teaches the tongue how to begin to lateralize by moving the food around the mouth with the hand, since the hand is more coordinated than the tongue at this point. When the pincer grasp develops between 10-12 months, the child is able to pick up a small cube of food and place it in the mouth.

While finger feeding should become noticeably efficient around 14-16 months, utensil use does not become efficient until after 24 months and should not be the primary way of self-feeding until after the age of 3 years. The best toddler utensil is one that is short in length (not the long infant feeding spoon), with an enlarged handle covered in a textured surface. This type of utensil is ideally suited to allow for the toddler’s wider and less proficient grasp pattern. A metal spoon bowl and metal blunted fork tines are preferred by the toddler to assist with poking the foods and because the rubber tipped infant feeding spoon has usually become a non-preferred item. The metal makes the toddler utensils different from the infant spoons and allows them to be more like the others in their family using “grown up” utensils. A heavy or weighted spoon is ideal as the slightly increased weight helps the toddler with their fine motor control.

The Parents’ Role
The most important tasks for parents teaching their older infants and children how to eat are: focusing on the mechanics of the task; choosing developmentally appropriate foods; and making the experience enjoyable. Pleasant, fun mealtimes help establish a life-long, healthy relationship with food.

In order for parents to teach their children to be good eaters, they need to become aware of the messages that they may be sending their child about food and/or about their own food preferences. If a parent is concerned that their older infant or toddler may not be able to handle a particular food and then looks worried about it, the child will get the message that the food is not safe and should be rejected.

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The overall goal of all treatment with children who won’t eat is to create a situation that positively reinforces normal, healthy eating patterns.

When children won’t eat, parents and professionals are often tempted to classify them in one of two categories: those who have “organic” or “physical” problems and those who have “behavioral” problems. These kinds of labels are not particularly helpful. First, because there is an implication of blame in this system, which is neither very accurate nor useful when trying to help children with feeding problems. Second, children with physical difficulties often develop behavioral problems after their attempts to eat don’t go well, and children with behavioral eating difficulties develop physical disorders after having poor nutrition for a period of time. So, there isn’t a clear-cut distinction between the two.

Rather than force children into categories where they don’t belong, we need to think about children who won’t eat as having had poor learning experiences with food. In other words, just as children learn to eat, they can also be taught not to eat by the circumstances in their lives.

Research shows that learning about food occurs in two main ways. The first is when a connection is made between one stimulus (a natural event, behavior, or object) and a second neutral stimulus. For example, we know that feeling sick to your stomach causes the physical reaction of appetite suppression. If feeling nauseous (a natural event) is consistently paired with a specific food (previously a neutral thing), eventually the food itself will cause nausea. Another example would be when pain is paired over time with food, as occurs with Gastroesophageal reflux (GER). When that happens a person learns to avoid or escape from situations that involve eating.

The second way that we learn is through reinforcement and punishment. Eating followed by praise or imitation (positive reinforcement) leads to more eating. Similarly, refusing food followed by lots of attention/interaction (also positive reinforcement) leads to more food refusal. So, in addition to increasing desired behaviors, positive reinforcement can cause more of an undesired behavior as well. Punishment around food is also very powerful. Booth showed that if the learning about food is unpleasant, our bodies turn off our appetites. Weingarten and Martin showed that if negative connections are made to the cues of eating (e.g., sitting down at the table, the utensils used, the people present, the room where meals are eaten), a child learns to avoid the feeding situation completely.

The overall goal of all treatment with children who won’t eat is to create a situation that positively reinforces normal, healthy eating patterns through:

**Structure** — Have a routine to mealtimes, eating in the same room, at the same table, with the same utensils, which capitalizes on the need for repetition in learning.

**Social modeling** — Allow children to learn through the observation of good mealtime role models. Parents who are poor or picky eaters will have a difficult time helping their children.

**Positive reinforcement** — Meals need to be pleasant and enjoyable, and any interaction with food should be rewarded. Verbal praise, a smile, a touch, a cheer, and hand clapping are all great options.

**Manageable foods** — Foods need to be prepared in small, easily chewable bites, or in long, thin strips that a child can easily hold.

**Learning about “the physics” of food** — The mouth and teeth will need to use hard pressure to break apart a carrot stick. Wiggly, squishy string cheese is chewy in the mouth. Yogurt, which is cold, wet and smooth, can just be sucked down.

When parents understand that eating is a learned behavior, in which there is an interplay between their child’s physical capabilities and his experiences with food, they can take on a positive teaching role with their children rather than a negative/forcing or no-limits approach to feeding. It clarifies for parents that there are things they can do to make the feeding situation better, and gives them hope. The approach also teaches parents, and reminds us professionals, that there are things we can do that may make the situation worse and reminds us how to avoid the pitfalls of working with children who won’t eat.


If the parent is concerned at all about their child’s physical capability of managing a food, they should instead “show and tell” the child how to eat the food. This means literally talking their older infant and toddler through the process of biting and chewing, as well as showing the child in an over-exaggerated fashion exactly how to move the food around in the mouth. For example, a parent would want to explain in very simple language how they manage a bite of a cracker by saying, “I’m going to bite with my front teeth and move it back to my strong back teeth with my tongue. Then I am going to chew, chew, chew.” The language needs to be paired with a large biting motion, with an open mouth to show how the tongue moves and then with an up and down head movement to emphasize the chewing motion. Recall that children in this age range learn best by watching others engage in an action. As such, parents need to be good role models for their infants and toddlers. This applies not only to role modeling the mechanics of eating, but also our food choices. If a parent makes a face and complains that they don’t like broccoli, it is doubtful that their child will eat this food either. Recent research suggests that the likes and dislikes of parents play a large role in whether or not their children learn to eat fruits and vegetables throughout their lives.8

Parents also need to remember that it may take an average of ten exposures to a new food, paired with positive reinforcement, before a child will consistently accept the food.9,10 If a child appears to dislike a food, the parent should maintain their cheerful face, reassure the child that they are “okay” using a positive voice and then model taking another bite themselves. If the reaction is very large again, the parent can continue to reassure and praise the child for taking the bite, but move on to a different food. The questionable food then needs to be tried again on a different day.

The flip side of needing to try new foods several times before prior to acceptance is not permitting a child to choose to eat the same food over and over again to the exclusion of any other foods. Known as a “food jag”, this behavior is especially prevalent in older toddlers and thought to be related to their discomfort with new foods, or neophobia.2,7 Food jagging is also believed to be a typical toddler feeding pattern and, therefore, is not viewed as a problem. However, a child allowed his food jags, eventually “burns out” on a particular food and refuse to eat it again, even after a month or more hiatus in children with feeding difficulties. As a result, the child loses more and more foods out of their food repertoire as they jag and burn out on each successive food, until there may be only 5-10 foods that he will eat. This child then needs professional help in order to assure a nutritionally adequate diet. For the typically developing child, a break from the food for about two weeks seems to be sufficient to allow the child to become willing to eat the food again.

Picky Eaters Versus Problem Feeders

<table>
<thead>
<tr>
<th>Picky Eaters</th>
<th>Problem Feeders</th>
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<tbody>
<tr>
<td>Decreased range or variety of foods.</td>
<td>Restricted range or variety of foods, usually less than 20 different foods.</td>
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<tr>
<td>Will eat 30 different foods or more.</td>
<td></td>
</tr>
<tr>
<td>Foods lost due to “burn out” because of a food jag are usually re-gained after a 2 week break.</td>
<td>Foods lost due to food jags are NOT re-acquired.</td>
</tr>
<tr>
<td>Able to tolerate new foods on plate and usually can touch or taste a new food (even if reluctantly).</td>
<td>Cries and “falls apart” when presented with new foods.</td>
</tr>
<tr>
<td>Eats at least one food from most all food texture groups.</td>
<td>Refuses entire categories of food textures.</td>
</tr>
<tr>
<td>Will add new foods to repetoire in 15-25 steps on Steps to Eating Hierarchy.</td>
<td>Adds new foods in more than 25 steps.</td>
</tr>
</tbody>
</table>

---

Parents need to be good role models for their infants and toddlers. This applies not only to role modeling the mechanics of eating, but also our food choices.
Lastly, parents should not forget that their older infant, and especially toddler, is becoming more interested in exploring the world than in eating. If meals and foods are not made fun and an extension of the child’s exploration of the world, there will be little incentive to come to the table to eat. Parents should feel free to get creative with the food — using cookie cutters to make different shapes in the food and natural food colorings to create foods that look interesting to eat. Describing the physical properties of the foods (texture, temperature, consistency, pliability) facilitates exploration by teaching children the “physics of food” and helps them understand how the food will feel, break apart and move in their mouths. Allowing the older infant and toddler to get messy and “play” with their food, will be especially helpful for gaining and maintaining interest in food.

Play centered on food needs to be “play-with-a-purpose”; play which teaches the child something new about the food. This type of play is different than play that happens when a child is done eating. Play-with-a-purpose allows the older infant and toddler to explore food as one more exciting and fun part of their world, as well as teach them how to manage food once it gets into their mouths. Hopefully while using these strategies, parents will re-discover an enjoyment in eating for themselves, which they can then impart to their children.

**Conclusion**

When parents of typically developing children in pediatric practices are polled, up to 33% of them indicate that they have problems getting their infant or toddler to eat. Parental stress around feeding can be greatly alleviated through guidance by a pediatric practitioner who can educate parents about the complexity of the process of learning to eat. This education empowers parents and helps them realize that there are things they can do which will make the feeding experience go better for their child and themselves. This guidance can also give them hope that their child will have a future healthy relationship with food.

Dr. Kay Toomey is a Pediatric Psychologist specializing in the assessment and treatment of children with feeding difficulties. She has been working with children who won’t eat for over ten years. Dr. Toomey co-founded the Oral Feeding Clinic at The Children’s Hospital in Denver in 1989, and acted as Director of the Rose Medical Center’s Pediatric Feeding Center from 1995 to 2001. Currently, Dr. Toomey is in private practice as the Director of the Colorado Pediatric Therapy & Feeding Specialists, Inc. She lectures nation-wide regarding her feeding treatment program, the SOS Approach To Feeding.

**References**

when you’re still learning...
there’s more to food than just eating

Babies need to learn to:
- First, move food around in their mouths without gagging
- Then, move their tongues from side to side
- Finally, place food on the molar area of the gums for chewing

Rather than spooning food in, gently touch the spoon to your baby’s lips and let her come for it.

Add soft table foods when your baby starts “chewing.”

Babies first learn to “munch” soft foods with their jaws up and down (9-10 months)

“Chewing,” comes second by adding a small grind with the teeth and a side-to-side motion with the jaw (between 12-14 months)

Babies need to explore toys and food with their hands and mouths.

- Begin cup drinking with a spillable, two-handed sipper cup. Let baby explore stick-shaped toys and foods (8 months)
- Add small, very meltable pieces of food (9 months)
- Introduce utensils around 1st birthday, but encourage finger feeding until after 2nd

Start feeding your baby in an infant seat
• Move her to a high chair around 8 months
• Bring your toddler in close to the family table

Choose appropriate foods
- Show and tell your baby how to eat and enjoy new foods
- Don’t give in to “food jags”
- “Dress up” the flavor of foods to make them more interesting – cheese sauce on peas, lemon sprinkled on cooked carrots

Coordinate of the eight senses:
• Seeing
• Hearing
• Tasting
• Touching
• Smelling
• Balance
• Body Awareness
• Joint Information

Repeate exposure is the key to learning to like a good variety of foods.

Do allow your baby to get messy!

Good back and side support is essential for good eating.

Do allow your baby to get messy!
Forty-percent of mothers of normally developing children will report difficult behaviors during mealtimes in the first 2 years of life. These feeding problems, which include picky eating, food jags, refusal to eat textured foods, refusal to eat at all, and stalling, are typically outgrown. Another group of children—those with eating impairments that involve oral-motor skills (dysphagia)—are at risk of life-long feeding problems. These are children born very prematurely, with failure-to-thrive, genetic syndromes, oral apraxias, encephalopathies, traumatic brain injury or developmental delay. Whether the eating impairment is mild, moderate or severe, these children will not outgrow their feeding difficulties. Therapy will improve their overall feeding skills, but it will not completely eliminate the problem.

This article will discuss the pathologies and severity of the clinical manifestations of eating impairments and help the pediatrician determine if a feeding problem can be dealt with in the office, or if a referral or further evaluation/treatment are indicated.
Neither the cause nor the effect of feeding problems is isolated to the ingestive system; thus, problems that can arise from and affect other systems of the body will also be discussed.

**Behavioral Characteristics of Ingestive Problems**

Feeding difficulties during infancy most frequently manifest as problems with: 1) eating efficiency, (i.e., the feeding effort of the child and indirectly the caregiver), 2) controlling the ingestion of liquids, and 3) poor oral-motor skills. Difficulty with the ingestion of liquids and poor oral-motor skills are not independent of poor eating efficiency. Both of these skills need to be well-developed to ingest a meal with ease and in a reasonable amount of time (20-30 minutes).4 Mealtimes exceeding this range may point toward greater feeding effort. When feeding effort exceeds the required energy intake, a child may not be able to keep up with growth demands and marginal nutrition or frank energy malnutrition may result.5,6 Interestingly, children with mild feeding problems take longer to eat solid foods, whereas children with moderate and severe problems take significantly longer to eat both solids and purees. While this observation may appear counter-intuitive at first glance, it points to the fact that manipulating and controlling “runny” food substances in the mouth is more difficult than the more solid, firm food textures.7

**Triage in the Pediatrician’s Office**

A thorough medical history and physical examination will help determine to what extent underlying medical problems may be contributing to a child’s feeding problem. A thorough medical history and physical examination will help the clinician determine if feeding difficulties are complicated by interaction problems between the child and feeder. Because liquids are the most difficult to ingest, children with oral-motor problems are often constipated.10 The caregiver may believe adequate amounts of liquids are being offered, but much (up to 50%) of the volume may be lost due to spilling.5 A child who is constipated is not interested in eating.

**Examination of the oral phase** begins with an observation of the general oral health, the shape of the palate and the dentition. Children with carious lesions often experience sensitivities to hot or cold, or to sweet foods and may refuse foods that cause pain. Prompt dental care usually resolves the problem.3 A determination of feeding efficiency follows, by getting an estimate of meal duration and if the child is able to eat different food textures, enjoys or at least tolerates different flavors, and how difficult drinking is. The frequency of coughing during or after meals, regurgitation, choking or vomiting needs to be established. Food refusals may be texture or taste related or, when nutrient related, may point toward food allergies. There may be oral sensory deficits but, unless very obvious, these are difficult to examine reliably.

**Examination of the pharyngeal phase** may begin with an observation of how often children swallow on a bite of food. One or two swallows are considered normal.11 Repeated effortful swallowing points toward inefficiency in feeding and possible associated pharyngeal problems. If the child sounds congested and the caregiver indicates that this is the child’s normal function, or if there is a history of recent repeated pneumonias, then aspiration may be suspected. Referral for a video-fluoroscopy would be justified.
Examination of the esophageal phase. Persistent gastro-esophageal reflux with regurgitation may indicate a chronic condition that can be very painful and lead to food refusal. Pharmacologic treatment of the condition has been described. Incoordination of the peristaltic wave initiated by swallowing has been described in children with encephalopathies, but can also be present in myopathies. Liquids may still be ingested adequately, but the transport of a solid bolus will be much more difficult and may cause discomfort. These children may be reluctant to accept the tacky and more solid food textures. Peristaltic incoordination is not isolated to the esophagus and delayed gastric emptying often accompanies coordination disorders.

Some private, as well as hospital-based clinics exist that specialize in ingestive problems, hence patients may be referred for evaluation and treatment in this highly specialized field. If these resources are not readily available due to geographic distance, consultation by phone, fax or e-mail can usually be arranged. Children who require specialized care and long-term follow-up due to the complexity of their medical and rehabilitation needs are best referred for evaluation and services by a multidisciplinary team.

Assessment by a Feeding Specialist
To evaluate the nature and extent of a feeding problem, the dysphagia specialist relies on observational as well as instrumental assessments of anthropometry, feeding efficiency, and oral-motor skills.

Anthropometric measurements of height and weight measurements contribute to the classification of the problem as mild, moderate or severe. If a reliable measurement of height is difficult to obtain, due to contractures or other growth deformities, body segments of arm and leg length may be substituted. Measurements of skinfolds (triceps, subscapular) are excellent indicators of energy reserves.

Measurement of feeding efficiency helps identify the feeding effort of the child and indirectly the caregiver. Standards of feeding efficiency for young children, 6 months to 2 years and 2 to 8 years, have been developed. Examination of eating efficiency requires the eating of three textures of food: puree (unsweetened apple sauce), viscous (raisins) and solid (wheat biscuits). The examination is videotaped so that the duration (in seconds) for each texture can be calculated. This examination has proven very useful for the diagnostic characterization of mild, moderate and severe problems.

Standardized reliable and valid assessments also may be used. The Schedule for Oral Motor Assessment [SOMA] is intended for children, 8 months to 2 years of age, who have mild eating impairments and The Multidisciplinary Feeding Profile was developed for children with neurologically based eating impairments. Gisel and collaborators have used the Functional Feeding Assessment (FFA) extensively for the assessment of children with cerebral palsy and feeding impairments. The FFA consists of a meal observation covering both normal and abnormal feeding responses in six domains: spoon feeding, biting, chewing, cup- and straw-drinking and the externally visible signs of swallowing. The FFA is sensitive to change so that the effectiveness of treatment can be determined.

Anthropometric measurements, feeding efficiency and oral-motor skills constitute the basic components of our initial assessment, but other domains may need further evaluation, such as sensory and taste perceptions. For children with oral-motor deficits, reliable sensory responses are very difficult to obtain. Assessments often require verbal responses that children may not be able to give reliably, or tests require the manipulation of an object in the mouth. The motor deficit may hinder the manipulation of the object and affect accurate sensory perception of the stimulus.

Some children have oral...
Oral-Motor Milestones During Infancy

During early infancy, the oral movements of suckling occur in rhythmic unison with the jaw.1 The lips form a seal around the nipple, and the lowering of the jaw creates a vacuum in the oral cavity that permits the extraction of liquid.2 There is also a component of compression, through the closing of the jaw that squeezes milk from the nipple.3 Together, suction and expression contribute to a highly efficient system of feeding.

Later, during weaning the older infant begins to munch (vertical movements of the jaw) and chew (vertical and rotary movements of the jaw) modified solid food textures of an adult diet.4 In this process the jaw assumes a stabilizing function, permitting the tongue greater freedom of movement to place food between the teeth for chewing (lateral movements) and to direct food in preparation for swallowing. Drinking from a cup or straw requires that the jaw be held in a semi-open, stable position and that the lips engage the drinking utensil so that the liquid content can be taken in a sequence of sips.4 These movements emerge spontaneously in the typically developing child. However, infants experiencing difficulty with the oral-motor components of weaning, particularly stabilization of the jaw, often confirm earlier suspicions that there may be developmental delay or disability. A child whose development does not progress to a stable jaw will have great difficulty or may not be able to make the transition to the feeding of solids.4 These movements emerge spontaneously in the typically developing child. However, infants experiencing difficulty with the oral-motor components of weaning, particularly stabilization of the jaw, often confirm earlier suspicions that there may be developmental delay or disability. A child whose development does not progress to a stable jaw will have great difficulty or may not be able to make the transition to the feeding of solids. While delay vs. disability during weaning may be difficult to distinguish, recent work has shown that many children do not “grow out” of these difficulties.5 Hence, prompt attention to mothers’ concerns, evaluation and therapy are essential to ameliorate these problems.

Treatment Options

Gisel and Alphonce have proposed a classification system of mild, moderate and severe problems based on anthropometric measurements, feeding efficiency and oral-motor skills.3 This approach has proven very helpful for diagnosis and treatment planning because children in each category have different treatment needs.

Mild Feeding Problems

Children with mild feeding problems may benefit from special feeding utensils. These may be designed to make the grasp of the utensil easier, provide a scooping edge on the plate to facilitate food pick-up, or prevent the spill of liquids by providing a lid with a drinking spout on cups. Children’s weight should be monitored at least twice a year to ensure they follow their established growth trajectory. In general, children may require more time to eat than their peers and where possible, this extra time should be provided.6 Children with mild feeding problems tend to eat foods with softer textures (muffins, yogurts, soft fruits etc.), which can reduce feeding effort and so maximize intake.38 One component of oral-motor problems may be a deficit in motor planning, i.e. a dyspraxia or apraxia.36 A study is currently in progress to determine if praxis training may improve oral-motor, hence, feeding skills.39

Moderate Feeding Problems

In terms of oral-motor competence, two treatment approaches have been systematically studied in children with moderate feeding problems: a) sensorimotor treatment and b) treatment with intra-oral devices.

Sensorimotor treatment. Five to 7 minutes of sensorimotor exercises once a day for 5 days a week, over a period of 10 weeks, has resulted in significant improvements in biting, chewing, the handling of purees and swallowing.29,31 The maintenance of these skills over the longer term has not yet been studied.

While improved oral-motor skills may facilitate the day-to-day feeding, as children enter their adolescent growth spurt, when growth demands double, oral-motor therapy alone cannot meet their growth needs. Oral supplementation with high calorie foods and drinks will be necessary. This group of children is also prone to upper respiratory infections; they tend to lose weight during bouts of illness and catching up in growth after recovery is difficult if not impossible.29

**Oral appliance therapy.** Appliance therapy with the Innbruck Sensorimotor Activator and Regulator (ISMAR) has been studied extensively in children with moderate feeding impairments.32-34,37,40 The appliance facilitates the permanent stabilization of the jaw, thereby permitting the tongue to begin moving more freely.34 In general, children wear the appliance for at least a year in order to benefit maximally from its impact on the oral-pharyngeal apparatus.33 Follow-up during a second year showed that children maintained the skills gained during the first year of ISMAR therapy.32

Children with moderate feeding problems may have ambulatory problems and depend on wheelchairs, walkers or tricycles for transportation. They may be incontinent, lack trunk and head control to various degrees, and be dependent on others in many activities of daily living. It has been our working hypothesis over a number of years that a reciprocal relationship exists between body posture and oral structures and vice versa. Examination of this relationship with ISMAR therapy has demonstrated that there were significant improvements in head-trunk-foot control and that the ambulatory status of children improved significantly above the level of maturation.31 Children on ISMAR therapy (mean age 8.3±0.9 years) also gained sufficient weight to sustain their growth trajectory over the study period of 2 years. While there were no significant changes in terms of weight catch-up, the skills gained nevertheless allowed them to eat more, so that they could sustain the increased growth needs of their larger bodies.

**Severe Feeding Problems**
Children with severe feeding problems come to the attention of the clinician during the first months of life. Suckling is disorganized and inefficient, and the infant quickly fails to gain weight. There may be gastro-esophageal reflux and the infant may be irritable and difficult to calm. Current management approaches are based on the fact that infants triple their body weight in the first year of life and gain another 30% during the second year.3 To meet this extraordinary growth need, nutritional support via tube feeding41,42 must be instituted promptly. Children needing supplemental tube feeds for longer than 4 weeks will be considered for gastrostomy feeding43 to free the nasal passages, as well as the pharyngeal-esophageal structures of the tube which occasionally can be irritating to the child. Tube feeding may persist throughout childhood and often results in children who will no longer want to eat orally. Therefore, the benefits of adequate nutrition and typical use of the oral ingestive system must be weighed carefully when such decisions have to be made. Since there is a risk of aspirating saliva if the child no longer takes anything by mouth, our philosophy is to encourage limited food intake with textures that are safe to ingest (determined by clinical history and videofluoroscopy). Importantly, parents have indicated to us that feeding their child is one of the few remaining meaningful activities for them. Thus, from a social point of view providing “sustenance” is essential for the caregiver. As severely affected children have many medical and rehabilitation needs, they are usually managed by a multidisciplinary team consisting of, but not limited to, a developmental pediatrician, physical-, occupational- and speech therapist, and other health professionals as specific health needs arise.

**continued on page 20**
Putting Research Into Practice
Jacquelin Kilburn, MA, OTR

With the “Back to Sleep” movement and convenience of baby carriers, many parents and care providers have lost sight of the fact that babies need to experience many different positions and movements to develop normally. Clinically, we are now seeing babies with flattened skulls, poor head control, an inability to lift or support their head, extreme resistance to being placed prone, delayed motor milestones, poor fine motor skills, and an increased incidence of torticollis.

A 50% reduction in SIDS deaths confirms that “Back to Sleep” saves lives. In addition, infants need to spend daily waking time on their tummy to promote the normal developmental sequence. Tummy time develops neck extensors and reciprocal innervation with the flexors, which provides head control and allows the child to lift the head to clear the nose and airway if accidentally moved into this position. Head control also plays an important role in the suck/swallow/breathe synchrony, speech, chewing, swallowing, sitting and standing. Head turning established during tummy time supports airway drainage and throat clearing. Working in the tummy down position also promotes strengthening of all back extensors, shoulder girdle, arms, hands and eyes.

Experiencing tummy time from day one will prevent the vestibular system from losing comfort of being in all positions, expressed as a baby’s discomfort in or dislike for trying new positions. The vestibular system of a two or three month old does not accommodate change easily. Instead, the body will experience a negative often nauseating response, leading to a negative limbic response that yields an aversion to the activity expressed as a negative physical and emotional response to the position. The effect is similar to an adult experiencing an amusement park ride for the first time at the age of 30.

What to Tell Parents
In utero babies move around and experience every conceivable position, all of which are comfortable for them. Continued experience with a variety of positions and movements following birth helps babies remain comfortable with these positions while promoting normal development.

Initially, when young babies are on their tummy they work on strengthening muscles in their neck, upper back, arms, hands, and eyes. This will lead to the ability to lift their chest off the floor and eventually to the ability to push onto hands and knees and begin rocking and then crawling. The same muscles strengthened for crawling also provide the foundation for fine motor skill such as self-feeding, dressing and eventually building with blocks and writing.

Parents who share running commentaries with their babies, such as “I am going to pick you up, lay you on your back, and change your diaper,” help their infants learn what to expect as they are moved through space and give their baby an opportunity to prepare the body for the movement while promoting language development. Experiencing movement sensations also develops the vestibular or balance center in the brain. Parents who wear, dance, and talk with their baby promote their baby’s normal development.

If you have any question about delays in development or potential developmental issues, please refer to a pediatric physical or occupational therapist early. It is much easier and less expensive to treat issues before incorrect motor pathways have been established. Parents of infants and toddlers readily learn therapeutic handling, positioning, and other techniques. Many states in the US have federal funding to provide early intervention service to young children. Frequently the services are provided at home. If services are provided through the federal program they are free to the family.

Public schools or hospitals with NICU facilities typically channel access to these services. Free services are frequently educationally related. A child may see a clinician to provide medical and rehabilitative services simultaneously. Refer early to a pediatric therapist at a school, private clinic, or hospital for any developmental issues.

Jackie Kilburn has been a pediatric occupational therapist for thirty-one years. Before opening her private pediatric clinic in Livingston County, Michigan, she supervised the occupational therapy department at Mott Children’s Hospital in Ann Arbor, MI.
Whether a child’s feeding problems are mild, moderate or severe, the timing of feedings should be dictated by the family’s individual preferences and available resources. For example, some families may prefer to feed their child before the regular family meal so their attention can be focused on the child with special needs. When only a limited number of family members are able to feed the child, the burden typically falls on the same person at each meal. Some of our families hire helpers who feed the affected child, which provides considerable relief to the caregiver. Children need to be fed at least three times a day so unique strategies that minimize the feeding effort are usually worked out. The clinician needs to become familiar with these unique strategies. Similarly, many of the treatment approaches require a daily commitment of the family to do exercises. A limited number of treatments by a therapist will not have the same effect as sustained daily treatment over a specified period of time. Therapy will only occur if the time commitment fits into the family’s routine, or they are willing to make time available for it.

Feeding Problems Can Arise From and Affect Different Body Functions

The oral phase of ingestion constitutes only the beginning of the ingestive process, when food is chewed and mixed with saliva in preparation for swallowing. The second, the pharyngeal phase of ingestion, starts with the voluntary swallow and is followed by the esophageal phase, which begins with the entry of food into the esophagus and ends with the passage of food into the stomach through the relaxation of the lower esophageal sphincter. While the three phases are useful for describing ingestion conceptually, they are continuous and there is functional and temporal continuity between them. Feeding problems, which can manifest anywhere along this continuum, are not limited to the ingestive system and can affect other body systems as well.

Pulmonary Problems

Children whose rhythmic coordination of suckling or chewing and swallowing is impaired due to underlying medical problems are at risk for aspirating liquids or

Mothers are excellent judges of their children’s feeding abilities. They recognize and report when they are feeding their child more frequently than they had an older sibling, or compared to children of other mothers. Often the duration of the feeds will also be longer than that of comparison children. Mothers may change from breast to bottle-feeding, as it requires less effort. Nipple holes may be enlarged to facilitate flow, or different nipple shapes may be tried to find the most suitable for the child. If the infant is distractible, extraneous distractions such as blaring radios and TVs will be turned off, and sibling noise kept to a minimum. As children begin to wean, mothers may add extra calories to the food such as butter in pablums, and use milk products with high fat contents, such as full milk, yogurts and puddings.

All these strategies reflect a greater feeding effort on the part of the mother as well as the child. Careful judgment needs to be exercised to determine when such efforts may be exhausting to the mother and alternative strategies must be considered to relieve her, as well as to permit the child to continue to grow along a desirable growth trajectory.

## Pediatric Feeding Evaluation

### Medical History

<table>
<thead>
<tr>
<th>Height</th>
<th>Weight</th>
<th>BMI*</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Skin folds: (Triceps) (Subscapular)

Underlying medical problems, such as premature birth, genetic syndromes, oral apraxias, encephalopathies, failure to thrive, traumatic brain injury, or developmental delay?  Yes  No

### Oral Evaluation

<table>
<thead>
<tr>
<th>General oral health?</th>
<th>Good</th>
<th>Fair</th>
<th>Poor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shape of palate</td>
<td>Well Rounded</td>
<td>High Rounded</td>
<td></td>
</tr>
<tr>
<td>Dental condition?</td>
<td>Good</td>
<td>Fair</td>
<td>Poor</td>
</tr>
<tr>
<td>Estimated time of feeding/meal duration?</td>
<td>30 mins</td>
<td>&gt;30 mins</td>
<td></td>
</tr>
</tbody>
</table>

Any food textures that your child...

- refues to eat? If yes, which ones?  Yes  No
- prefers to eat? If yes, which ones?  Yes  No

Any food flavors that your child...

- refues to eat? If yes, which ones?  Yes  No
- prefers to eat? If yes, which ones?  Yes  No

### Pharyngeal Evaluation

<table>
<thead>
<tr>
<th>How many times does your child swallow on a bite of food?</th>
<th>1-2</th>
<th>3 or more</th>
</tr>
</thead>
<tbody>
<tr>
<td>Does your child frequently have colds or congestion?</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Does your child have a history of pneumonia?</td>
<td>Yes</td>
<td>No</td>
</tr>
</tbody>
</table>

### Esophageal Evaluation

<table>
<thead>
<tr>
<th>Does your child cough/spit up/vomit/choke during feedings/meals?</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Any discomfort (fussing, crying, arching the body) during or after feeding/meals?</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Is your child reluctant to accept liquids?</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Is your child reluctant to accept solid foods?</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Does your child spit up during the night (wet pillow)?</td>
<td>Yes</td>
<td>No</td>
</tr>
</tbody>
</table>

### Feeding Evaluation

If previously breast-fed, why was child changed to bottle feeding?

Have you altered the artificial nipple to facilitate feeding?  Yes  No
| If yes, in what manner? |

How would you describe mealtimes with your child?

---

* The newly revised pediatric growth charts – which include the new Body Mass Index (BMI) sets – are available on the Centers for Disease Control website (http://www.cdc.gov/growthcharts/).
more textured food substances into the lungs during swallowing. A healthy reaction to mis-swallowing is a vigorous cough to expectorate the aspirated material. Children who chronically aspirate minute amounts, however, learn to suppress the cough reflex. These are the “silent” aspirators. Videofluoroscopy (modified barium swallow) is the method of choice to determine the nature and extent of the problem.46

Some children tire from the “work” of eating and may be at greater risk for aspiration at the end of the meal, which is usually not examined in videofluoroscopy. However, recent work indicates that careful positioning of the child can minimize or even eliminate aspiration.43,47 In general, liquids are aspirated more frequently than solids.27,43,47-51 It is not known as yet, however, whether aspiration of small amounts of solids is as detrimental as the more frequent aspiration of liquids.45

Children who aspirate chronically sound congested, have frequent colds or even pneumonia.42 A causal relationship between aspiration and pulmonary disease is difficult to establish,50 partly because pulmonary disease is treated symptomatically. If children respond well to a course of antibiotic therapy, the diagnosis is often made a posteriori. Hence, the causative factors may not be identified. Preliminary work by Gisel and collaborators has shown that when children are well-positioned and aspiration is controlled, oral feeding may proceed with food textures that are safe to ingest.43 Pulmonary function improves significantly over the course of one year.

Gastrointestinal Problems
A discussion of digestive and absorptive problems is beyond the scope of this review. However, a major problem in children who have oral-motor disabilities is gastro-esophageal reflux (GER).35 It may manifest itself as repeated vomiting during or after meals or there may be a suspicion of reflux when children express signs of hunger and eagerness to start eating, but then refuse to continue a meal because eating is associated with discomfort or pain from the passage of food into the stomach. Reflux of acidic material into the esophagus can cause inflammation,54 hence the pain. Material from GER may also enter the respiratory tree and cause irritation and disease of the lungs.52,55-57 The method of choice for identifying reflux is 24hr pH monitoring which can be done on an ambulatory basis. Standards exist to determine the severity of the problem.58 Reflux is usually treated medically, but if the reflux cannot be controlled, a more invasive procedure such as fundoplication, a surgical tightening of the LES, may be considered.49,60 These procedures are not without risks and 15-50% complications have been reported.59,60 Food regurgitation, vomiting during or after meals, or spitting up at night (wet pillow) may cue the clinician to explore further the association between meals, regurgitation and pulmonary complications.

Oral ingestive problems touch upon an anatomy, physiology and patho-physiology that encompass many medical specialties: oto-rhinology, radiology, gastro-enterology, respirology, psychology and rehabilitation. While each specialty has its area of expertise, the collaboration of each may be needed to address the unique problems of children with oral ingestive dysfunctions. Children with encephalopathies, muscular disorders, prematurity and specific genetic disorders are still in need of further study to describe the diagnosis-specific needs of evaluation and treatment.

A particular challenge are children with metabolic disorders who frequently have associated oral-ingestive problems i.e. fucosidosis. The interaction of the two problems often limits aggressive oral-motor treatment. Our approach so far has been to focus first on nutrition, in order to meet caloric and nutrient needs, before addressing the oral-motor problems. While videofluoroscopy is a helpful adjunct to evaluate the nature and safety of the swallow, there is an urgent need for a non-invasive methodology that will permit extended and repeated visualization of the swallow.
Food regurgitation, vomiting during or after meals, or spitting up at night (wet pillow) may cue the clinician to explore further the association between meals, regurgitation and pulmonary complications.

**Conclusion**

Research in pediatric dysphagia has progressed rapidly over the past 20 years, with the accurate diagnosis and efficacy of specific interventions better understood than ever before. The pediatrician is often the first medical professional to examine and diagnose children with feeding problems. Recognition of the symptoms and classification of the nature of the problem will allow the pediatrician to take the necessary steps to ensure that the family receives the care and follow-up needed.

Dr. Erika Gisel's research on the oral-motor development of children and the efficacy of interventions for children with feeding disabilities is known internationally. She is a member of the Academy of Research of the American Occupational Therapy Foundation, and a member of the Research Advisory Board, Feeding Disorders Center at Baylor College of Medicine, Department of Pediatrics, Houston, TX. Dr. Gisel is on the editorial boards of Physical & Occupational Therapy in Pediatrics and Occupational Therapy in Health Care.

**References**

Recognition of the symptoms and classification of the nature of a feeding problem will allow the pediatrician to take the necessary steps to ensure that the family receives the care and follow-up needed.
There's more to food than just eating.

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Each quarter “Pediatrics On-Line” features new, unusual or topical Internet websites of interest to pediatric professionals. Below is the quarter’s featured list.

If you wish to recommend a website to your colleagues, please call the Gerber Professional Information Line at 1-800-595-0324, contact us via e-mail at gerber.medmktg@ch.novartis.com, or write Gerber Products Company, 200 Kimball Drive, Parsippany, NJ 07054-0622.

American Academy of Family Physicians
http://familydoctor.org

The American Academy of Family Physicians (AAFP) is a national, non-profit medical association serving family physicians, family practice residents and medical students. Their website features terrific information for parents, young children and teens, including Q&As about staying healthy and common health concerns, Health Topics Plus (detailed info on the most common health issues), facts on common medicines, herbal remedies and dietary supplements, and advice for what parents can treat at home and when they need to call the doctor.

Dysphagia Resource Center
Resources for swallowing and swallowing disorders
http://www.dysphagia.com

The Dysphagia Resource Center features very good information for those interested in swallowing and swallowing disorders. Links are provided to sites featuring the anatomy and physiology of swallowing, case studies, conferences, organizations, and resources. If you’re new to the site, you might want to begin with their impressive list of tutorials and articles.

Economic Research Service
http://www.ers.usda.gov

The Economic Research Service (ERS) is the main source of economic information and research from the U.S. Department of Agriculture. The ERS examines dietary quality, nutrient intake, and the roles of economic factors and nutrition education and information. In addition to recommended reading, such as America’s Eating Habits: Changes and Consequences, the ERS site offers a body of research and analysis on key topics, including food and nutrition. The site also features: The U.S. Food Marketing System, 2002, The Food Assistance Landscape, and Examining the Well-Being of Children.

Wide Smiles
Cleft Lip and Palate Resource
http://www.widesmiles.org

One child in 700 is born cleft-affected. It is the fourth most common birth defect, and the first most common facial birth defect. Wide Smiles offers support, inspiration, information and networking for families dealing with the challenges associated with cleft lip and cleft palate. In addition to an extensive array of short articles on all aspects of feeding an infant with a cleft lip or palate, the site also features articles on: terms and definitions, surgery, causes, insurance issues, dentistry/orthodontia, audiologe, speech, school and self-esteem, and much more.

Jump-In Products
http://www.jump-in-products.com

JUMP-IN™ Therapy Products, founded by occupational therapist and product developer Jacqueline Kilburn, features 450 therapy products for professionals, families and care providers that encourage sensory processing, physical restoration and fun. You will find a generous offering of books, videos, and therapy music, as well as hand function squeeze toys, and self-care products.

National Center for Research Resources
http://www.ncrr.nih.gov

The National Center for Research Resources (NCRR) “serves as a ‘catalyst for discovery’ by creating and providing critical research technologies and shared resources” for addressing pressing trans-NIH research issues. Program directions emphasize “smart,” network-connected technologies, computer-aided drug design, development and testing of gene and molecular therapies, bioengineering approaches to decrease health care costs, and enhanced training and career development for patient-oriented research.

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