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FEEDING GUIDELINES:

Developmental Guidelines for Feeding Infants and Young Children

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Fast Scan: Feeding is a social activity that relies on the science of nutrition to aid in food selection. Food and feeding styles must provide for the young child's social and nutritional as well as developmental needs. A primary focus in nurturing with food is on the infant's eating capabilities and a willingness to trust the infant's signals for food regulation and food preference. An infant up to age five or six months (who is able only to root for the nipple and suck) is most appropriately given a milk feeding as he is cuddled and nursed or bottle fed. During the second half year, his chewing, body positioning and hand control abilities develop rapidly. His feeding style must match and challenge, but not overwhelm those abilities. By his first birthday he will sit at the family table and finger-feed himself with modified adult food. Safety in feeding requires appropriate food selection, adapting food to match the child's capabilities, and adequate supervision during feeding.

Feeding is a social activity as well as a science. The caretaker who is to be effective with feeding has to have a background of information or custom that lets her choose developmentally appropriate foods that satisfy a child's nutritional needs.

This article deals primarily with selection of types and forms and consistency of feeding that are appropriate for the developing child. As a background to food selection, it is helpful to consider some aspects of the social relationship between parent and child:

The Feeding Relationship

The feeding relationship is the complex of interactions that take place between parent and child as they engage in food selection, ingestion and regulation behaviors. Successful feeding calls for a caretaker who trusts and depends on information coming from the child about timing, amount, preference, pacing and eating capability.

Feeding is successful when the parent attends to the child's rhythms and signals of hunger and satiety, works to calm him and develops mechanics of feeding that are effective with a particular child's emotional make-up and feeding skills and limitations.

If feeding is successful, mother and child develop a synchronous relationship. They get to know each other; they are successful with each other. From the mother-child relationship the child learns some important lessons. He gains in awareness of what he is feeling, in the knowledge that he is capable of conveying what he wants, and in trust that someone will be willing to provide that for him (1).

On the other hand, if the caretaker is consistently inaccurate or domineering about feeding, parent and child develop an *asynchronous* relationship: they are *out* of rhythm with each other and therefore unsuccessful. This is to the detriment of both: the parent is confronted with a dissatisfied or overly passive baby; the child grows up confused and anxious about his needs. The child gains little sense of effectiveness because what he wants is seldom accurately identified and gratified and is often in conflict with what his mother seems to want to give him. He comes to feel that what he gets is independent of anything coming from *him*.

Social and emotional learning is especially powerful within the context of feeding. Much of the social time parent and child spend together in the first year is involved with feeding. During that early time feeding is the most concrete demonstration of what is considered appropriate in a child and what the parent will and won't accept.

Developmental Overview

Foods offered to the young child must provide for nutritional as well as developmental needs. A young infant who is only able to root for the nipple and suckle is most appropriately given a milk feeding as he is cuddled and breastfed or bottle fed.

An older infant who can sit up, open his mouth when he sees something coming, and swallow semisolid food can be spoon- and cup-fed and begin to get his nutrients from a variety of well-chosen foods.

As finger dexterity and chewing skills improve, the young child can begin to feed himself and ingest a greater variety of food. He then makes the transition to lumpier and chewier food, and finally to table food.

Appropriate feeding demands that parents learn to wait for and recognize the

INTRODUCING THE AUTHOR

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Throughout her career in clinical dietetics Ms. Satter has increasingly emphasized the importance of a biopsychosocial approach to eating. This multidisciplinary approach is applied in her recent book *Child of Mine: Feeding with Love and Good Sense*. Ms. Satter also lectures and conducts workshops on feeding and eating throughout the life cycle. She is a member of the American Dietetic Association and the National Association of Social Workers. ■

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indications of a child's readiness for more mature eating styles.

Feeding Periods

During the first year the child passes through three reasonably distinct feeding periods (2):

- **0-6 months** – Milk Feeding
- **4-12 months** – Transition (begin solids)
- **8-12 months on** – Modified Adult

These times overlap and are rather indistinct. Babies develop at widely differing rates. When a child progresses from one feeding style to the next should always be determined on the basis of his *capability* rather than on the basis of his age (see Table 1 on page 24).

Mouth Neuromuscular Patterns

Mouth neuromuscular patterns develop in the growing child. Mouthing appropriately modified and prepared food allows a child to develop the skills to utilize the patterns. The skills do not emerge spontaneously. The child who is ready to begin eating solid foods has developed enough control of his mouth muscles so he can close his lips over a spoon, pull the food from the spoon with action of his lips and transfer the food from the tip of his tongue to the back where he swallows it. Until a certain point in maturation he simply can't do that.

The younger child can only suckle: he keeps his mouth fastened on the nipple (partially by suction), and his tongue goes backward and forward as he strokes the milk from the nipple and swallows. If solid foods are offered by spoon, this suckling motion merely pushes the food back out and onto his chin. To get solids down, the very young infant has to be in a semi-reclining position and a very runny "solid" has to be placed far back on his tongue. The necessity for doing this persists until a child's mouth neuromuscular patterns mature. Spoon feeding does not appear to accelerate the maturation of feeding skills (3).

0-6 Months – Milk Feeding

The newborn rooting reflex allows the infant to turn toward a touch near his mouth and root for the nipple. Most newborns have a well-developed suckling pattern and have sufficient stamina to get enough food from the nipple to satisfy their calorie needs. At this stage, breastmilk with certain supplements (4,5) or an appropriately constituted infant formula is the food of choice. Most babies also are able to regulate the quantity of food they eat by signaling their sensations of hunger and satiety to the sensitive caretaker.

5-7 Months – Begin Solids

Somewhere between five and seven months a child begins to show developmental signs that indicate that he is ready for a more mature feeding style. A child who is ready to begin solid foods sits up, is able to see food approaching and opens his mouth for it. He can learn to close his mouth over the spoon, scrape the food from the spoon with his lips and move the food from the front to the back of his tongue.

Swallowing his first semisolids trains the child in transferring food back along the surface of his tongue. This requires an up-and-down motion of the tongue, which first appears at this stage. To swallow effectively, the child must gather the food into a bolus and exert enough force with his tongue to propel it into the pharynx (the muscle and membranc pouch between the mouth and the esophagus) where involuntary muscles take over in moving the food through the cricopharyngeus (the sphincter at the top of the esophagus) and into the esophagus.

During swallowing, the food moves past the larynx (the opening to the windpipe, or trachea) which is just above the junction of the pharynx and esophagus. Clearly, gravity aids in this process. Swallowing is aided if the child is in an upright position and facing straight forward.

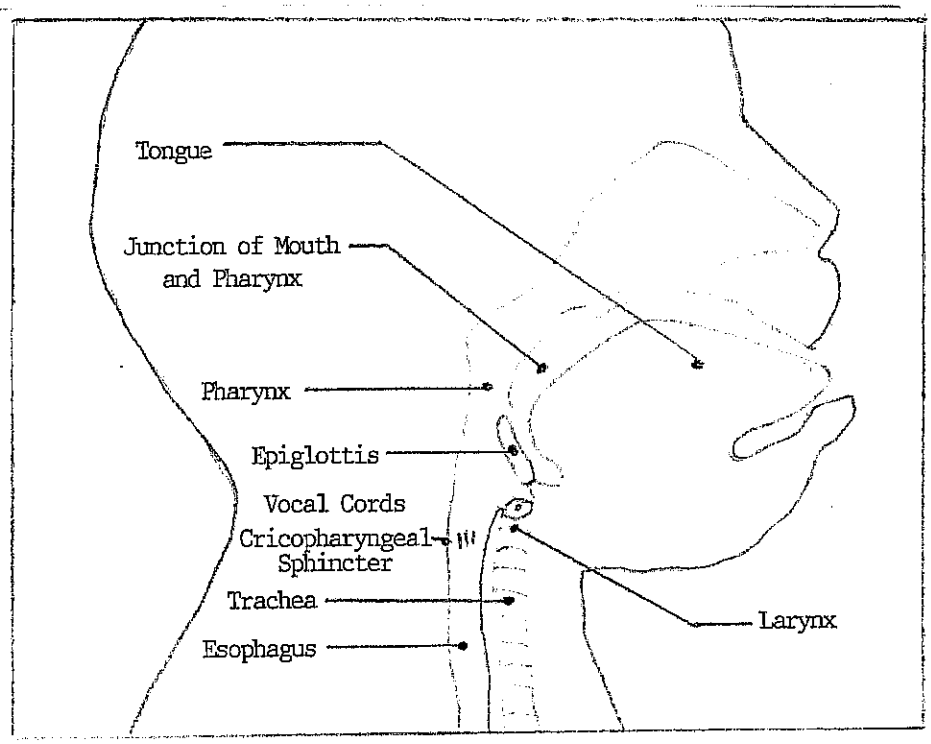
The five- to seven-month-old child can swallow fairly thick semisolids without gagging and choking. A child gags when he hasn't swallowed vigorously or efficiently enough to clear food from the back of his tongue. The food remains stationary and activates the gag reflex, which propels the food forward on the tongue. The gag reflex remains exceptionally well developed in most infants up until about age four months and functions as a defense against choking. Then it begins to be inhibited during feeding.

Dealing with Solids

One of the prerequisites for dealing with solids orally appears to be toning down this gag reflex by mouthing and exploring toys with a variety of textures and shapes (3). Some babies have a disinterest in mouthing because they are slow to mature. Or, their mouthing experience may be limited by tube feeding or because they don't have enough neuromuscular control to get things in the mouth.

The baby who doesn't explore with his mouth may need help getting used to that experience before he can accept solids easily. A parent might rub his jaw with her fingers or guide a thumb, pacifier or toy into

The Swallowing – Breathing Anatomy of The Newborn Infant



try and fish.

Meat, poultry and fish provide important amounts of iron, zinc and B-vitamins in the diet. Iron in animal protein sources is several times as well absorbed as iron from vegetable sources. Meat also contains an as yet undefined substance called "meat factor" which increases the absorption of vegetable sources of iron (8).

Nonmeat sources of protein and iron have limitations. Egg yolk iron is poorly absorbed and can actually impair iron absorption from other foods (8). Whole grains and nuts and legumes offer trace elements and protein, but: (a) Iron is poorly absorbed (9); (b) The high fiber content may block trace element absorption (10); and (c) The concentration of protein is so low that most children can't eat enough to satisfy their protein needs (11).

When Children Eat Meat

Children need help when they eat meat. Meat fibers are long and chewy so they are harder for the child to move around in the mouth and chew. Moist, tender meats are easier to swallow than dry or hardened, overcooked fibers. Poultry and fish can be cooked tender and shredded. Meat can be sliced finely across the grain and crumbled apart to mix in with potatoes or rice so they can be picked up and eaten easily. Purchased puréed baby meats can be incorporated in the same way.

Ground beef, too, is easily eaten. Patties can be kept on hand frozen to cook (only until the red changes color so meat stays moist) when the family is having a roast or chops that the child would find hard to chew.

Luncheon meats and hot dogs are often used because children like them and they are soft and easy to chew. They are acceptable meat selections as long as they are cut up to prevent choking. Hot dogs can be cut lengthwise into four strips so the pieces are no longer large enough in diameter to block the upper airway if they are aspirated. Hot dogs and luncheon meats can be overused, however, if they are the only or predominate meat source in the diet.

Processed meats are higher in salt and fat then fresh meats. Research data are simply not clear enough to support taking a stand on limiting amounts of either of these nutrients in the child's diet (12). But a judgement can be based on the general nutritional principles of moderation and variety. Processed meats are acceptable in moderation as part of a range of animal protein sources.

The Second Year and Beyond

The toddler and preschooler continue to increase their chewing and swallowing abilities and manual dexterity. Somewhere between one and two years of age the child starts to use eating utensils and even develops some dexterity with them.

Not until 25 to 36 months of age can he spontaneously transfer food smoothly from side to side without a pause at the center of his tongue (3). Other adult-type patterns appear. Jaw movement begins to follow the tongue and produce a more circular-rotary jaw movement during feeding.

The toddler, and to some extent the preschooler, still needs some modest modification of food so he can be successful with his eating. He has difficulty chewing firm and fibrous food like meat, and too-dry food seems to get stuck in his mouth. He isn't dextrous enough to cut with a knife, so foods should be cut into bite-sized pieces for him.

Some foods at the meal should be soft and moist. Room temperature foods are often more acceptable. Salads without dressing make good finger foods, and soups should be thin enough to drink from a cup or to spoon easily.

Into and past the preschool period, the child still benefits if food is made easier to chew and swallow. The four- and five-year-old child still contracts the muscles around the mouth to assist his swallow (13). Since we don't see contraction of oral-facial muscles in the adult, we may presume that the preschooler's pattern is immature and still somewhat limited.

Table 1. Feeding Capabilities in the Infant and Toddler

Birth to Six Months*	**Seven to Ten Months**
Roots for nipple	Bite matures
Suckles	Rotary chew
Five to Seven Months	Transfers food from side to side
Begins to sit	Curves lips around cup
Follows food with eyes	**Age Twelve Months**
Begins swallow	Sociability increases
Lips close over spoon	Interest in solids increases
Six to Eight Months	Cup drinking improves
Tongue moves laterally	**Second Year and Beyond**
Controls position of food in mouth	Circular rotary chewing
Controls swallow	No pause in side to side transfer
Munches	Begins to use utensils

* Ages overlap because babies develop at different rates.

Safety in Feeding

Clearly, the young child needs help in remaining safe during the food consumption process. Children do choke on food. They can inhale food into the airway during the course of eating. If the food is of a size to get lodged in the upper airway, it can cut off the air supply. If someone is there to apply emergency procedures (14), and if the food can be dislodged, tragedy can be averted. But children have died from choking.

A recent article in the *Journal of the American Medical Association* (15) described 103 children under age nine who died from food asphyxiation over a two-year period. Most affected children were under age two. Firm, smooth, slippery foods of a size that would block the

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Table 2. Some Guidelines for Feeding Safety for Young Children

1. Gradually build a child's feeding skills as described in this article.
2. Maintain an appropriate and positive feeding relationship with the focus on the child's capabilities.
3. For the child under age three, avoid foods that are particularly difficult to control in the mouth, chew and swallow, such as nuts, raw carrots, gum drops and jelly beans.
4. Modify some foods to reduce any risk of choking. Meat can be cut up as described, grapes quartered, carrots cooked.
5. Provide adult supervision during feeding.
6. Insist that children, especially young children, sit down while they eat. Some of the offending foods are of the sort that are eaten "on the run," such as nuts, hot dogs or gum drops.
7. Keep eating times free of intense feelings. Fighting, excitement, hilarity, conflict are all stimuli that could make a child catch his breath and inhale food.

of learning to eat is important for anyone working with young children. ■

Feeding Guidelines

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windpipe were implicated in the deaths: hot dogs – 17 cases, candy – 10, nuts – 9 and grapes – 8. Probably choking incidence is dose related: Children eat hot dogs more often than they eat grapes.

A multidisciplinary conference, Foods and Choking in Children (16), was held in Maryland in August 1983. The conference investigated causes and solutions to the choking problem. Among other recommendations, the group proposed: (a) warning labels for foods intended for children; (b) modifying the form of foods wherever possible to decrease their risk potential; and (c) educating parents about developmentally appropriate feeding.

Choking on food is an immediate danger throughout the growing-up years. Most parents treat this danger matter-of-factly, by gradually progressing the texture, piece size and firmness of their child's food as his abilities develop and by keeping an eye on him while he eats. This is appropriate. It would be detrimental to the development of the child and the feeding relationship overall to have the parent constantly worried and hovering during feeding.

One must find some reasonable balance in feeding that minimizes the chances of choking without depriving the child of developing his eating ability. Some reasonable approaches are included in Table 2 on page 24, Some Guidelines for Feeding Safety for Young Chidren.

Impairments in Ability to Chew and Swallow

Some children have impairments in neuromuscular control of eating. In some this is easy to see, such as the child with Down's syndrome or with cerebral palsy. In other cases it is not so readily detectable. A child who appears to be developing otherwise in a perfectly normal way may have difficulty mastering eating behaviors within the time ranges that we generally see.

If this difficulty persists, the parent should get a referral from his pediatrician to an Occupational Therapist or Speech Therapist who works with eating behavior and is experienced in evaluating and training the patterns involved in eating. An experienced consultant should be able to distinguish neuromuscular limitation from simple inexperience or resistance.

Summary

Learning the skill of eating tends to be taken for granted by many adults. Eating is made up of a complex set of skills that must be accumulated gradually. Becoming informed about the developmental sequence

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