

## CHAPTER 2: DEVELOPMENT OF INFANT FEEDING SKILLS

An infant's developmental readiness determines the type and texture of foods to feed and which feeding styles to use. Each infant develops at his or her own rate. Although age and size often correspond with developmental readiness, these should not be used as the only factors considered when deciding what and how to feed infants. The rate at which an infant progresses to each new food texture and feeding style is determined by the infant's own skills and attitudes. Some infants are cautious, others venturesome. Infants always do better if they are allowed to develop at their own rate. It is important to be aware of the stages of mouth, hand, and body skill development in infants so that you can provide appropriate nutrition counseling on food types, texture, and feeding methods to caregivers. This chapter provides an overview of the development of feeding skills, the rate of acquisition of skills, and the feeding relationship. Counseling points related to the information presented in this chapter are found in Chapter 8, page 165.

### Infant Development and Feeding Skills

Newborn infants are only able to suck and swallow liquids because of their limited level of development, but these skills are integral to their survival. Their ability to feed well at birth can be attributed to a combination of reflexive responses that enables them to locate the source of nourishment, suck, and swallow the liquid.<sup>1</sup>

*Reflexive responses important for successful feeding during early infancy are described as follows:*<sup>1</sup>

- **Rooting reflex** -When an infant's oral area (corners of the mouth, upper and lower lip, cheek, and chin) is touched by an object, he reacts. The infant turns in the direction of the object and opens his or her mouth. This reflex allows the infant to locate the source of food (i.e. seek out and grasp a nipple). This reflex is seen from birth to about 4 months.
- **Suck/Swallow reflex** - When an infant's lips and mouth area are touched, the mouth opens and suckling or sucking movements begin. As liquid moves into the mouth, the tongue immediately moves it to the back of the mouth for swallowing. This reflex facilitates feeding from the breast or bottle but not from a spoon or cup. This reflex is seen from birth to about 4 months.
- **Tongue thrust reflex** - When the lips are touched, the infant's tongue extends out of the mouth. This reflex allows for feeding from the breast or bottle but not from a spoon or cup. This reflex is seen from birth to about 4 to 6 months.
- **Gag reflex** - The infant gags when any object, such as a spoon or a piece of solid food, is placed way back in the mouth; the object is then propelled forward on the tongue. This reflex helps to protect an infant from swallowing inappropriate food or objects that could cause choking. This reflex is one reason for delaying the introduction of complementary foods until 4 to 6 months. This reflex diminishes by 4 months, but is retained to some extent in adults.

*Note that infants with developmental disabilities may retain these reflexes longer than normally expected or the reflexes may be stronger or weaker than normal.*

As infants mature, they gain the skills necessary to progress from eating strained complementary foods from a spoon to feeding themselves finger foods and eventually begin to feed themselves with a spoon (see Chapter 5 for more information regarding complementary foods). This acquisition of skills follows a sequential pattern that is similar in most infants. However, each infant is unique. As shown in Figure 1, page 41, it is normal for infants to develop the skills and abilities needed for feeding progression at their own rates. Caregivers must carefully observe and acknowledge when major reflexive responses needed during early infancy have diminished and the infant has developed the mouth patterns, hand and body skills, and feeding skills required to consume more than infant formula or breast milk.

Hand and body skill development is an important factor in establishing when to introduce complementary foods as well as determining the infant's ability to eat foods of different textures as he or she grows older. Most infants have good head control and can sit with support between 4 and 6 months. When these skills are developed in conjunction with mouth pattern development, such as the ability to transfer food from the front to the back of the tongue to swallow (See Figure 1, page 41), the introduction of complementary foods with a spoon is appropriate. An infant's ability to control the neck and head as well as balance the trunk are required for the infant to sit without support and use hand and arm movements in the self-feeding process. Two significant developmental skills acquired during the self-feeding process are the palmer grasp and the pincer grasp. At about 6 months, infants develop what is known as a palmer grasp - the ability to push something into the palm using the fingers. Between 6 and 8 months, they develop the ability to hold something between their thumb and forefinger - this is called a pincer grasp. When these skills have developed, infants can begin to feed themselves with their hands and try finger foods.

Figure 1-Sequence of Infant Development and Feeding Skills in Normal, Healthy Full-Term Infants, page 41, summarizes the development of an infant's mouth, hand, and body skills and how these skills correspond with an infant's ability to consume different complementary foods. Recognizing these skills is important for assessing when certain types and textures of food should be introduced at certain stages of an infant's development. *Refer infants who appear to have feeding problems to a health care provider for assessment.*

## **When Do Infants Develop Different Feeding Skills?**

A parent/caregiver may expect their infant to acquire certain feeding skills at specific ages associated with "normal development." However, infants develop the skill to feed themselves at varying rates.<sup>2</sup> Parents/caregivers need to be aware of their infants' developmental capabilities and nutritional needs when deciding the type, amount, and texture of food to feed their child as well as the method of feeding (e.g., use a spoon for feeding; allow self-feeding with fingers). A survey of caregivers of more than 3,000 infants and toddlers indicated the following skills and age ranges:<sup>3</sup>

**Figure 1: Sequence of Development and Feeding Skills in Healthy, Full-Term Infants**

Infant's Approx. Age	Mouth Patterns	Hand and Body Skills	Feeding Skills or Abilities	Hunger and Satiety (Fullness) Cues
<b>Birth through 5 months</b>	<ul style="list-style-type: none"> <li>• Suck/swallow reflex</li> <li>• Tongue thrust reflex</li> <li>• Rooting reflex</li> <li>• Gag reflex</li> </ul>	<ul style="list-style-type: none"> <li>• Poor control of head, neck, trunk</li> <li>• Needs head support</li> <li>• Brings hands to mouth around 3 months</li> </ul>	<ul style="list-style-type: none"> <li>• Swallows liquids but pushes most solid objects from the mouth</li> <li>• Coordinates suck-swallow-breathe while breast or bottle feeding</li> <li>• Moves tongue forward and back to suck</li> </ul>	<p><b>Hunger cues:</b></p> <ul style="list-style-type: none"> <li>• Wakes and tosses</li> <li>• Sucks on fist</li> <li>• Cries or fusses</li> <li>• Opens mouth while feeding to indicate wanting more</li> </ul> <p><b>Satiety cues:</b></p> <ul style="list-style-type: none"> <li>• Seals lips together</li> <li>• Turns head away</li> <li>• Decreases or stops sucking</li> <li>• Spits out the nipple or falls asleep when full</li> </ul>
<b>4 months through 6 months</b>	<ul style="list-style-type: none"> <li>• Up-and-down munching movement</li> <li>• Transfers food from front to back of tongue to swallow</li> <li>• Draws in upper or lower lip as spoon is removed from mouth</li> <li>• Tongue thrust and rooting reflexes begin to disappear</li> <li>• Gag reflex diminishes</li> <li>• Opens mouth when sees spoon approaching</li> </ul>	<ul style="list-style-type: none"> <li>• Sits with support</li> <li>• Good head control</li> <li>• Uses whole hand to grasp objects (palmer grasp)</li> <li>• Recognizes spoon and holds mouth open as spoon approaches</li> </ul>	<ul style="list-style-type: none"> <li>• Takes in a spoonful of pureed or strained food and swallows without choking</li> <li>• Drinks small amounts from cup when held by another person, with spilling</li> </ul>	<p><b>Hunger cues:</b></p> <ul style="list-style-type: none"> <li>• Cries or fusses</li> <li>• Smiles, gazes at caregiver, or coos during feeding to indicate wanting more</li> <li>• Moves head toward spoon or tries to swipe food towards mouth</li> </ul> <p><b>Satiety cues:</b></p> <ul style="list-style-type: none"> <li>• Decreases rate of sucking or stops sucking when full</li> <li>• Spits out the nipple</li> <li>• Turns head away</li> <li>• May be distracted or pay attention to surroundings more</li> </ul>
<b>5 months through 9 months</b>	<ul style="list-style-type: none"> <li>• Begins to control the position of food in the mouth</li> <li>• Up-and-down munching movement</li> <li>• Positions food between jaws for chewing</li> </ul>	<ul style="list-style-type: none"> <li>• Begins to sit alone unsupported</li> <li>• Follows food with eyes</li> <li>• Transfers food from one hand to the other</li> <li>• Tries to grasp foods such as toast, crackers,</li> </ul>	<ul style="list-style-type: none"> <li>• Begins to eat mashed foods</li> <li>• Eats from a spoon easily</li> <li>• Drinks from a cup with some spilling</li> <li>• Begins to feed self with hands</li> </ul>	<p><b>Hunger cues:</b></p> <ul style="list-style-type: none"> <li>• Reaches for spoon or food</li> <li>• Points to food</li> </ul> <p><b>Satiety cues:</b></p> <ul style="list-style-type: none"> <li>• Eating slows down</li> <li>• Clenches mouth shut or pushes food away</li> </ul>

		and teething biscuits with all fingers and pull them into the palm.		
<b>8 months through 11 months</b>	<ul style="list-style-type: none"> <li>• Moves food from side to side in mouth</li> <li>• Begins to use jaw and tongue to mash food</li> <li>• Begins to curve lips around rim of cup</li> <li>• Begins to chew in rotary pattern (diagonal movement of the jaw as food is moved to the side or center of the mouth)</li> </ul>	<ul style="list-style-type: none"> <li>• Sits alone easily</li> <li>• Transfers objects from hand to mouth</li> <li>• Begins to use thumb and index finger to pick up objects (pincer grasp)</li> <li>• Feeds self finger foods</li> <li>• Plays with spoon at mealtimes, but does not spoon-feed yet</li> </ul>	<ul style="list-style-type: none"> <li>• Begins to eat ground or finely chopped food and small pieces of soft food</li> <li>• Begins to experiment with spoon but prefers to feed self with hands</li> <li>• Drinks from a cup with less spilling</li> </ul>	<p><b>Hunger cues:</b></p> <ul style="list-style-type: none"> <li>• Reaches for food</li> <li>• Points to food</li> <li>• Gets excited when food is presented</li> </ul> <p><b>Satiety cues:</b></p> <ul style="list-style-type: none"> <li>• Eating slows down</li> <li>• Pushes food away</li> </ul>
<b>10 months through 12 months</b>	<ul style="list-style-type: none"> <li>• Rotary chewing (diagonal movement of the jaw as food is moved to the side or center of the mouth)</li> </ul>	<ul style="list-style-type: none"> <li>• Feeds self easily with fingers</li> <li>• Begins to put spoon in mouth</li> <li>• Dips spoon in food rather than scooping</li> <li>• Demands to spoon-feed self</li> <li>• Begins to hold cup with two hands</li> <li>• Drinks from a straw</li> <li>• Good eye-hand-mouth coordination</li> </ul>	<ul style="list-style-type: none"> <li>• Begins to eat chopped food and small pieces of soft, cooked table food</li> <li>• Begins spoon-feeding self with help</li> <li>• Bites through a variety of textures</li> </ul>	<p><b>Hunger cues:</b></p> <ul style="list-style-type: none"> <li>• Expresses desire for specific food with words or sounds</li> </ul> <p><b>Satiety cues:</b></p> <ul style="list-style-type: none"> <li>• Shakes head to say “no more”</li> </ul>

\*Developmental stages may vary with individual infants.  
 Developed with the use of references 1, 5, 7, 8 and 9.

- Grasps food with hands - 68 percent of 4- to 6-month-old infants and 96 percent of 7- to 8-month-old infants demonstrated this skill.
- Removes food from spoon with lips without spilling much - 77 percent of 7- to 8-month-old infants, 88 percent of 9- to 11-month-old infants, and 90 percent of 12- to 14-month-old infants demonstrated this skill.
- Self-feeds with spoon without spilling much - 5 percent of 7- to 8-month-old infants, 11 percent of 9- to 11-month-old infants, 29 percent of 12- to 14-month-old infants, and 64 percent of 15- to 18-month-old infants demonstrated this skill.
- Drinks from sippy cup without help - 42 percent of 7- to 8-month-old infants, 70 percent of 9- to 11-month-old infants, 91 percent of 12- to 14-month-old infants, and 96 percent of 15- to 18-month-old infants demonstrated this skill.
- Drinks from a regular cup without help - 10 percent of 9- to 11-month-old infants, 14 percent of 12- to 14-month-old infants, and 34 percent of 15- to 18-month-old infants demonstrated this skill.

See Figure 1, page 41, for the sequence of development of feeding skills for a healthy, full-term infant.

## **The Feeding Relationship**

The interactions and communication between a caregiver and infant during feeding influence the infant's ability to progress in feeding skills and consume a nutritionally adequate diet. These interactions comprise "the feeding relationship," defined as "the complex of interactions that take place between the parent and infant as they engage in food selection, ingestion, and regulation behaviors."<sup>4</sup> This relationship is nurtured when the caregiver correctly interprets the infant's feeding cues and abilities, is attentive to the infant's needs, and responds appropriately to satisfy those needs.<sup>5</sup> When the feeding relationship is positive (the caregiver is sensitive and responsive to an infant's feeding cues) and the infant is fed a nutritionally balanced diet, the infant's health and nutritional status is promoted. See page 46, Figure 2: Desired Outcomes for the Infant and the Role of the Family in the Feeding Relationship.

A dysfunctional feeding relationship can result in poor dietary intake and impaired growth.<sup>5</sup> Such a negative relationship is characterized by a caregiver consistently misinterpreting, ignoring, or overruling the infant's feeding cues, e.g., when a caregiver regularly forces an infant to consume additional food after he or she has become full and satisfied. Infants whose feeding cues are not eliciting the expected response from their caregiver tend to become dissatisfied, confused about their sensations of hunger and satiety (fullness), and may become unusually passive.

Conversely, infants whose intake is strictly regulated by their caregivers may develop unhealthy food preferences. Evidence indicates infants will self-regulate their energy intake when how much they consume is within their control,<sup>6</sup> but when infants are not allowed some measure of self-control in the feeding process, they may develop preferences for high-fat, high-calorie foods

and may not learn to pay attention to their own internal cues of hunger and satiety.<sup>7</sup> This lack of attention to hunger and satiety cues has been linked to childhood obesity.

*Instruct caregivers to observe the following hunger and satiety cues:<sup>7,8</sup>*

Table 2: Infant Hunger and Satiety Cues

Infant's Approximate Age	Hunger Cues	Satiety (Fullness) Cues
Birth through 5 months	<ul style="list-style-type: none"> <li>▪ Wakes and tosses</li> <li>▪ Sucks on fist</li> <li>▪ Cries or fusses</li> <li>▪ Opens mouth while feeding to indicate wanting more</li> </ul>	<ul style="list-style-type: none"> <li>▪ Seals lips together</li> <li>▪ Turns head away</li> <li>▪ Decreases or stops sucking</li> <li>▪ Spits out the nipple or falls asleep when full</li> </ul>
4 months through 6 months	<ul style="list-style-type: none"> <li>▪ Cries or fusses</li> <li>▪ Smiles, gazes at caregiver, or coos during feeding to indicate wanting more</li> <li>▪ Moves head toward spoon or tries to swipe food towards mouth</li> </ul>	<ul style="list-style-type: none"> <li>▪ Decreases rate of sucking or stops sucking when full</li> <li>▪ Spits out the nipple</li> <li>▪ Turns head away</li> <li>▪ May be distracted or pays attention to surroundings more</li> </ul>
5 months through 9 months	<ul style="list-style-type: none"> <li>▪ Reaches for spoon or food</li> <li>▪ Points to food</li> </ul>	<ul style="list-style-type: none"> <li>▪ Eating slows down</li> <li>▪ Clenches mouth shut or pushes food away</li> </ul>
8 months through 11 months	<ul style="list-style-type: none"> <li>▪ Reaches for food</li> <li>▪ Points to food</li> <li>▪ Gets excited when food is presented</li> </ul>	<ul style="list-style-type: none"> <li>▪ Eating slows down</li> <li>▪ Pushes food away</li> </ul>
10 months through 12 months	<ul style="list-style-type: none"> <li>▪ Expresses desire for specific food with words or sounds</li> </ul>	<ul style="list-style-type: none"> <li>▪ Shakes head to say “no more”</li> </ul>

*To develop positive feeding relationships between caregivers and their infants, encourage caregivers to:<sup>5</sup>*

- Be sensitive to their infants' hunger, satiety, and food preferences and act promptly and appropriately to meet their feeding needs. Also, it is best to avoid putting the infant on a rigid feeding schedule. An older infant can be offered food at around the time when he or she usually eats but, in general, the caregiver should watch for the infant to indicate hunger. Feeding at specific intervals of time may be necessary if an infant has certain medical conditions or is a sleepy infant who needs to be awakened to feed.
- Remember their infants' developmental capabilities and nutritional needs when deciding the type, amount, and texture of food and the method of feeding (e.g., use a spoon for feeding;

allow self-feeding with fingers). See Figure 1, page 41, for more information regarding the development of feeding skills for healthy, full-term infants.

- Offer food in a positive and accepting fashion without forcing or enticing the infant to eat. Avoid withholding food. Infants are biologically capable of regulating their own food intake to meet their needs for growth. Their diets may vary in the amount and types of foods eaten each day.

*In addition, caregivers can help their infants have positive feeding experiences and learn new eating skills by making the feeding environment relaxed and calm in these ways:*

- Designate a comfortable place in the home for feeding and act calm and relaxed during feeding.
- Have patience and take time to communicate with and learn about their infant during feeding.
- Show their infant lots of love, attention, and cuddling in addition to feeding - reassure them that doing so will decrease fussiness and will not "spoil" the infant.

In some instances, social and financial problems within a household may cause anxiety with detrimental effects on the interaction and feeding relationship between caregiver and infant--this can lead to failure to thrive in an infant. *If you perceive that a caregiver is not recognizing an infant's feeding cues, responds to them inappropriately, or cannot feed the infant properly, the infant and caregiver should be referred to:*

- A health care provider for advice
- Resources offering help with parenting skills
- A specialist or other services for psychosocial evaluation or
- The Early Periodic Screening, Diagnosis, and Treatment Program (EPSDT) for additional assessment, counseling, and follow-up services.

See page 46, Figure 2: Desired Outcomes for the Infant and the Role of the Family in the Feeding Relationship, and Satter's work (1986 and 1987),<sup>4,5</sup> for more information regarding the feeding relationship. See Bright Futures in Practice: Nutrition (2002)<sup>9</sup> for more information concerning feeding cues.

**Figure 2: Desired Outcomes for the Infant and the Role of the Family in the Feeding Relationship**

**Infant**

<b>Educational/Attitudinal</b>	<b>Behavioral</b>	<b>Health</b>
<ul style="list-style-type: none"> <li>• Has a sense of trust</li> <li>• Bonds with parents</li> <li>• Enjoys eating</li> </ul>	<ul style="list-style-type: none"> <li>• Breastfeeds successfully</li> <li>• Bottle feeds successfully if not breastfeeding</li> <li>• Consumes complementary foods to support appropriate growth and development</li> </ul>	<ul style="list-style-type: none"> <li>• Develops normal rooting, sucking, and swallowing reflexes</li> <li>• Develops fine and gross motor skills</li> <li>• Grows and develops at an appropriate rate</li> <li>• Maintains good health</li> </ul>

**Family**

<b>Educational/Attitudinal</b>	<b>Behavioral</b>	<b>Health</b>
<ul style="list-style-type: none"> <li>• Bonds with the infant</li> <li>• Enjoys feeding the infant</li> <li>• Understands the infant's nutrition needs</li> <li>• Acquires a sense of competence in meeting the infant's needs</li> <li>• Understands the importance of a healthy lifestyle, including healthy eating behaviors and regular physical activity, to promote short-term and long-term health</li> </ul>	<ul style="list-style-type: none"> <li>• Meets the infant's nutrition needs</li> <li>• Responds to infant's hunger and satiety cues</li> <li>• Holds the infant when breastfeeding or bottle feeding and maintains eye contact</li> <li>• Talks to the infant during feeding</li> <li>• Provides a pleasant eating environment</li> <li>• Uses nutrition programs and food resources if needed</li> <li>• Seeks help when problems occur</li> </ul>	<ul style="list-style-type: none"> <li>• Maintains good health</li> </ul>

Story M, Holt K, Sofka D, eds. 2000. Bright Futures in Practice: Nutrition. Arlington, VA: National Center for Education in Maternal and Child Health.

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