

The Developmental Progression of Eating Skills

Identification of Early Feeding Issues

Introduction

From the day we are born, to the last day of life, eating is an essential part of daily living. Few other activities of daily living have such far reaching implications for physical and mental health throughout the lifespan. Consider the current myriad of chronic diseases that are associated with poor nutrition and eating habits – obesity, type 2 diabetes and cardiovascular disease just to mention a few. On the other hand, healthy eating sets the foundation for wellness in all body systems. Eating, however, is about much more than nourishment. Nearly every major life event includes food or centers around a meal. Feeding and eating are strongly associated with love and joy. From the newborn infant's first suck at the breast or bottle, the bonding with the mother or caregiver is essential and this connection with food and nourishment continues throughout the lifespan.

Feeding and eating is a deeply social activity and defines us culturally. Healthy eating plays an essential role in promoting wellness and has gained significant attention over the last 20 years. Countries around the world, including the United States, are promoting public health initiatives to help individuals gain a basic understanding of the differences in a healthy diet versus an unhealthy diet.¹ And yet, picky eating and feeding problems in young children in the United States continue to be quite high. Researchers Lefton-Grief and Arvedson found that the prevalence of feeding related problems or swallowing issues in pediatric populations ranged from 25% to 45% in children classified as developing typically and 33% to 80% in children classified as developmentally delayed.² Parents need more support in how to promote healthy eating habits. Unfortunately, medical professionals receive limited education in the area of "typical" feeding development and few know how to support parents in actually getting children to adopt healthy eating behaviors. As this topic is often excluded from the education of many health professionals, it is essential for health care providers who come into contact with parents of young children to seek out professional development opportunities to become more familiar with healthy feeding behaviors. Health professionals can use the information

provided in this lifelong learning feature as a reference to support parents and answer questions about eating development.

LEARNING OBJECTIVES

Upon completion of this course, the dental professional will be able to:

1. Describe the stages of feeding for the infant, toddler and school-age child.
2. Identify three early feeding or developmental experiences that may alter the shape of a child's palate and facial structures.
3. Describe the oral-motor, oral-sensory and developmental skills necessary for feeding at each stage.
4. Identify the signs and symptoms related to feeding and eating skills indicating the need for a referral to another professional for further evaluation.

DEVELOPMENTAL PROGRESSION OF FEEDING AND EATING SKILLS

Eating is a complex activity that combines a number of factors, including precisely coordinated motor patterns, strength, endurance, oral sensory awareness, respiratory support, and cognition as well as others. Most children develop these interrelated feeding skills without the need for much external support. While there is a range for skill acquisition, most infants and children follow a similar pattern of oral feeding development. However, every infant is unique and there will be differences in the developmental timeline based on the baby's temperament, experiences, and individual personality. In addition to this natural fluctuation, feeding skill attainment can be dramatically influenced by many external factors. Early experiences such as prematurity, prolonged hospitalizations or frequent illness can significantly impact feeding skill development, as well as the more subtle lifestyle differences such as exclusive breast feeding as compared to exclusive bottle feeding.

Most babies transition to solids around 4-6 months and wean from a bottle to a cup around 12 to 18 months. When a baby or child is not meeting these oral feeding skill milestones within the expected time frame, this can serve as a red flag alerting a practitioner or watchful parent to the need for extra support.

Birth to 3 Months

Feeding is entirely dependent on primitive reflexes; primarily the root, suck, and gag reflex. These reflexes can be diminished or absent based on the infant's experience, level of alertness, and overall health. Reflexive feeding requires months of "practice" in order for the infant to develop the neuro-pathways that will lead to motor coordination and volitional control of foundational feeding skills.



Sucking

The infant uses a "cupped" tongue to surround and grasp the nipple. Milk is expressed using compression and suction. The infant's tongue extends and retracts and also moves up and down. The extension and upward movement of the tongue compresses the nipple to squeeze out milk, while the retraction and

downward movement creates negative pressure inside the mouth to express milk from a nipple. Infants suck using a suck-swallow-breathe pattern at the rate of one suck, for every swallow/ breath. This sucking pattern occurs around once per second. Infants in the middle of feeding usually suck with sequential sucks, or a sucking burst, of approximately 20 sucks per burst or more. Both breast and bottle fed infants may use a pacifier during the first year or two of life, however, the American Academy of Pediatrics suggests delaying pacifier use until a baby is at least 4 weeks old.

Pacifier Use ³	
Pros	Cons
Calming aid	Can detract from early breastfeeding success
Non-nutritive sucking helps with neurologic organization in young infants	May contribute to increased ear infections
Pacifier use, especially at night offers some protection against SIDS	Prolonged and consistent use past 2 years can lead to malformation of the palate with possible feeding and speech formation issues

Special Considerations

The resting and moving tongue position is important for the development of palatal arches. Persistent pressure on any particular area can lead to malformation of the palate, with the potential to cause malalignment of the teeth. Newborns and young infants are also particularly susceptible to dysfunctional alignment of the jaw and palate due to common conditions including ankyloglossia associated with swallowing and sucking difficulties; prematurity causing the newborn to be too weak to position themselves against gravity, torticollis associated with a unilateral shortening of the neck muscles leading to persistent head turn and plagiocephaly causing a flattening or distortion of the head.

3 to 4 Months

The primitive reflexes integrate during this period. Feeding skills now must be coordinated as it becomes a volitional versus a reflexive activity. A good example of this integration is when a nipple is placed in a newborn's mouth, they will reflexively suck, whereas, if a nipple is placed in a 4 month olds mouth, they will choose whether or not they will suck. While sucking is no longer reflexive, it remains as the predominant oral motor pattern for the 3 to 4 month old and their primary source of nutrition and hydration. It is also notable that at around 4 months that the infant should show improved head and neck control will often have enough motor control of their body to start rolling over.

4 to 6 Months

The American Academy of Pediatrics (AAP) recommends introducing solid foods (complimentary foods) at approximately 6 months of age but no earlier than 4 months.⁴ Early introduction of solid foods can be considered due to the fact that a large amount of motor development occurs during this period and some infants may be ready to progress to solid foods as early as four months.

Between the ages of 4 to 6 months, the infant will begin

Developmental signs indicating readiness to introduce solid foods

- Head/neck control to sit up for ~15 minutes
- Trunk control to sit up with minimal support
- Ability to reach for objects and bring them to the mouth (including a refining ability to grasp with fingers, not just the palm)
- Active interest (cognitive awareness) of food and mealtime

Continued on Page 8

to open his or her mouth to approach food or any other inanimate object such as a spoon or a toy. However, the infant will most likely use their suck response to manage any solid foods or purees placed in their mouth. Due to the tongue protrusion response, the 4-6 month old will have difficulty transferring food to the pharyngeal cavity to initiate a swallow. Their chewing skills are still immature and the tongue does not volitionally move to the side of the mouth in order to bring food to the gums or back of the mouth. At this age, the tongue is only able to lateralize, move to the side of the mouth, in a reflexive response to tactile stimulation. The gag reflex is also triggered closer to the front of the mouth (in the middle of the tongue). While a strong gag response can appear to be a potential emergency, it is actually a natural response which helps to protect a child from true choking, forcing food out of the pharynx and mouth before it is able to enter the airway.

Tips for Transitioning to Solid Foods

- Begin slowly, remember this is a brand new skill and will improve and refine itself gradually over the next 6-12 months.
- At first, offer solid foods when baby is not super hungry so that she or he does not become too frustrated. This is a new skill and it will take some time before the baby can successfully take in and swallow purees or solid foods.
- Babies learn about eating through exploration and play, so allowing the baby to touch, squish, smash and otherwise explore the foods you serve can increase interest and improve acceptance
- Babies should eat at their own pace and should not be “forced” to finish eating on a schedule.
- If the baby is crying, pushing the food away, turning away, or acting upset, consider backing off for a few days, but continue to bring the baby to the table while you eat so that he or she can observe you and learn. Keep in mind that he or she get their calories and hydration from breastmilk or formula so stopping the introduction of solids for a few days or a few weeks should not impact their weight gain or nutrient intake.
- Offer healthy foods over and over again, even if baby refuses them. Don’t force, just offer. Many babies need the same food introduced 10-15 times before they will accept and eat it.



- Model healthy eating habits and let your baby watch you eat. Babies learn best from watching and mimicking what we do so, set a good example!
- Remember the phrase: “food is for fun until age one” which means that until around 12 months, a baby should be getting most of their nutrition and hydration from breastmilk or formula.

6 to 8 Months

The majority of the 6 to 7 month old infants’ calories, nutrition, and hydration should continue to come from breastmilk or formula, as they already have the oral motor patterns that allow for the most efficient intake and management of these foods. In addition, breast milk and formula are significantly higher than other foods in the specific nutrients that developing infants continue to require. Around this age, many infants will have an emerging pincer grasp, although it still lacks coordination. Infants begin to show increased

lip closure with solid food feeding or spoon feeding and the top lip is more engaged at this age to clear food from a spoon. Chewing skills are also emerging if the infant is given the opportunity to practice this pattern. The chewing pattern however is very immature because the jaw is unstable and the infant is unable to bite through food easily. If given the opportunity, drinking through a straw also emerges at this time.

9 to 12 Months

As a baby approaches 12 months old, he or she will begin to show improved control of the muscles of the face and mouth. Most

infants develop improved tongue tip elevation and lateralization, as well as graded biting, all of which lead to improved chewing of soft chewables and mashable foods (for example, ripe bananas, avocados, well cooked pasta, scrambled eggs, etc.) Infants will also show improved lip closure while chewing, which leads to more consistent swallowing of solid foods. While the baby will have increased solid food intake at around 12 months, keep in mind that each child will learn at their own pace and remember that “food is for fun until age one.” Therefore, breastmilk or formula volumes should be decreased gradually during this time.

Babies between the ages of 9 to 12 months are also refining their gross and fine motor skills. They explore food, as well as their

environment, with their hands and mouth and are motivated to touch, squish, suck and eat new foods and flavors. Infants this age are developing a pincer grasp as well as the ability to release objects from their grasp, which allows them to pick up smaller food items and successfully bring them to their mouth for eating. At the same time, infants are getting stronger as they learn to crawl and pull up to standing.

12 to 16 Months

Tongue lateralization and chewing is improving and becoming more refined during this period. Toddlers continue to develop their ability to manage mixed textures and firmer foods although they will still lose food from their mouth. They will also spit out foods that are difficult to chew. Between 12 and 16 months, toddlers should be partially or completely weaned from bottle feeding or breastfeeding as they increase their solid food intake. The toddler's gross motor skills will continue to improve as they begin cruising along furniture and eventually will begin walking independently.

16 to 18 Months

By this time, toddlers are better able to chew and move food around their mouth, which allows for minimal loss of food from mouth while chewing. They are still developing jaw stability, leading toddlers to stabilize their jaw when drinking by biting on the rim of a cup. Self-feeding skills are becoming more refined and spoon and fork skills improve as the toddler approaches 18 months. Molar teeth may begin to erupt around 18 months, which increases the ability to grind more resistive foods. Toddlers should also be walking independently by 18 months.

19 to 24 Months

New feeding skills continue to emerge by 24 months, including the ability to use the tongue to clear food from the lips. The 19 to 24 month old should be able to transfer a bolus of food across the midline of tongue. While the younger toddler uses up and down jaw movements for chewing, the almost 2 year old should demonstrate more consistently diagonal chewing movements, which are closer to the rotary patterns used by an adult. The ability to use diagonal chewing patterns allows the 24 month old to safely chew most textures, although he or she will still require direct supervision for safety. By 24 months, the toddler should be able to successfully drink from a cup without loss of liquid. Fine motor skills will continue to refine during this time, the toddler may be able to button large buttons and pull zippers up and down.

25 to 36 Months

As a toddler approaches 3 years, he or she should be able to use their tongue to clear the vestibules between the gums and cheek, and chew using diagonal as well as rotary movements/patterns. The 3 year old should be able to run, climb, and use reciprocal steps to go up stairs. Their fine motor patterns may be mature enough so that they are able to peel a tangerine.

36 Months to 5 Years

During the period between 3 and 5 years, all feeding skills should be present but they are still refining. The preschooler is building endurance and coordination in their feeding and motor skills during this time through consistent trial and error and daily practice. Children should be able to tolerate most food textures without issue by the age of 3 years, and eat without direct supervision by 4 to 5 years.

Making a Referral

It is important to remember that every baby and child will develop feeding and eating skills along their own path and the absence or delayed acquisition of one or two skills is not necessarily significant to the overall development of the child's ability to eat. However, assessment of the acquisition and development of these incremental skills can be used by a health professional to identify children who may be at risk of developing feeding issues. Health professionals can then provide the appropriate referrals for parents

Signs and Symptoms for a Specialist Referral

- Poor weight gain
- Excessively long feeding times
- Coughing with meals
- Not transitioning to solids
- Refusing certain textures
- Very limited diet
- Picky eating
- Mealtime conflicts
- Excessive drooling or drooling that persists past the age of 3
- Very sensitive gag response
- Extreme fear or pain response with basic oral care
- Persistent refusal of basic oral hygiene
- Presence of Early Childhood Caries (ECC)

Continued on Page 10

in order to help diagnose and address problems before the infant or child develops negative habits or unhealthy eating patterns.

The primary referral should be to the child's pediatrician for further evaluation. If the physician believes there is a sensory, motor, or behavioral issue, a secondary referral can be made to an occupational therapist who specializes in feeding, eating, and swallowing issues to evaluate and treat the child as well as provide support for the family. Referrals can also be made to a dietician, psychologist, and/or speech and language pathologist if necessary.

The Dental Hygienist's Role

Health professionals who have an awareness of what the typical developmental skill acquisition should look like from infancy through early childhood can help assess whether or not the child is at risk for developing future feeding issues. Dental hygienists are in an excellent position to ask key questions regarding feeding and eating skills as well as provide guidance to parents who may not be aware of the impact that feeding and eating behaviors can have on their child's current and future health. Dental hygienists may also be able to provide critical support by referring families to the appropriate specialists or resources in their communities.

Improved health and wellness is a goal that extends beyond the individual specialty areas in healthcare. Feeding is essential to the overall health and quality of life for our patients and wider community at large. Dental hygienists need to be part of the inter-disciplinary team addressing this critical issue. Poor nutrition and feeding skills affects every system in the body, including the dentition. Dental hygienists who gather a thorough health history and make observant facial and intra-oral examinations are perfectly poised to identify some of the red flags that may be impacting a child's feeding skills. This information can be shared with other medical team members for early intervention and support.

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Kary Rappaport is a pediatric occupational therapist with advanced training and certification in feeding and swallowing. She has been working with children with special needs, including medically complex and fragile patients at Children's Hospital Los Angeles, in addition to working in outpatient,

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Home Study Correspondence Course

**“The Developmental Progression of Eating Skills/
The Early Identification of Early Feeding Issues”**

2 CE Units – ADHA/CDHA Member \$25, Non-member \$35

Circle the correct answer for questions 1-10

1. Early infant experiences which can significantly impact feeding skill development include:
 - a. prolonged hospitalization and frequent illness
 - b. prematurity
 - c. exclusive breast feeding
 - d. all of the above
2. Which of the following are average feeding milestone for infants ?
 - a. transitioning to solids around 2-4 months and weaning from a bottle to a cup around 8-10 months
 - b. transitioning to solids around 4-6 months and weaning from a bottle to a cup around 10-12 months
 - c. transitioning to solids around 4-6 months and weaning from a bottle to a cup around 12-16 months
 - d. transitioning to solids around 10-12 months and weaning from a bottle to a cup around 18-24 months
3. Which of the following statements is true about the use of a pacifier?
 - a. pediatricians suggest delaying use until a baby is 4 weeks old
 - b. may contribute to increased ear infections
 - c. may help early breast feeding success
 - d. a and b
4. Prolonged and consistent use of the pacifier past two years of age can contribute to malformation of the palate.
 - a. True
 - b. False
5. Which of the following developmental signs indicate readiness to introduce solid foods?
 - a. enough head/ neck and trunk control to sit up for 45-60 minutes
 - b. the ability to grasp an infant spoon and bring it to the mouth
 - c. the ability to chew/macerate firm solid foods
 - d. the ability to reach for objects and bring them to the mouth
6. Which of the following is considered to be normal eating behavior for a 12 month old?
 - a. self feeding with spoon or fork
 - b. drinking from a cup without loss of liquid
 - c. spitting out foods that are unwanted or difficult to chew
 - d. all of the above
7. Milestones for the 18 month old toddler include:
 - a. walking independently
 - b. better ability to chew and move food around the mouth
 - c. developing/ refining spoon and fork skills
 - d. all of the above
8. At what age do the skills develop to allow coordination for diagonal/ rotary chewing and clearing of food in the vestibules between the gums and cheek?
 - a. 12-16 months
 - b. 16-18 months
 - c. 25-36 months
 - d. 4-5 years old
9. When making a referral it is important to remember that:
 - a. each child develops feeding or eating skills at individual rates with some variation
 - b. the absence or delay of acquisition of one or two skills is not an absolute indicator but a guideline for potential referral
 - c. assessment of these incremental skills can help identify children who might be at risk of developing feeding problems
 - d. all of the above
10. The primary referral for eating or feeding problems should be to:
 - a. a child psychologist
 - b. a physician or pediatrician
 - c. a dentist or pediatric dentist
 - d. social worker

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