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Typical Feeding Development: An Overview

Rhonda Mattingly, Ed.D, CCC-SLP

Moderated by:
Amy Natho, MS, CCC-SLP, CEU Administrator; SpeechPathology.com

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Typical Feeding Development

AN OVERVIEW

Disclosures

- Dr. Rhonda Mattingly receives a salary from her employer for her positions as Associate Professor and Director of Clinical Education the University of Louisville. She also received a stipend from SpeechPathology.com for this presentation.
Course Objectives

- List the 3-step hierarchy of functions important to human beings in relation to feeding.
- Name 3 ways developmental readiness influences feeding progression.
- Describe 3 ways in which relationships impact feeding development.

Comprehensive Approach

Feeding Development

- Feeding is related to developmental readiness
- Multisensorial, multifactorial, multidimensional processes
- Basic milestone timeline but based on alignment of all systems
The Senses and Feeding

- Sight
- Sounds
- Smell
- Touch
- Taste
- Vestibular
- Proprioception

Hierarchy of Feeding

- Breathing
- Postural Support
- Eating
Environmental Factors

- What is available to a child/family?
- What sources of nutrition are affordable?
- What is a child’s experience with tastes?
- What is a child’s health status?
- What is the status of a child’s hunger?
- What social norms dominate a child’s life?
- What nutritional needs does the child have?

Relationships and Feeding

- Feeding is based on observation, experience, interaction
- Reciprocal process between the child and caregiver
- The feeding relationship is dependent on an infant’s overall development
- The feeding relationship is supportive to an infant’s overall development
Best Case Scenario

- Association of hunger to “time to eat”
- Communication of hunger is expressed
- Caregiver recognizes and responds
- “All done” is communicated
- Caregiver responds with cessation of feeding

Caregiver-Child Relationship

Typical Feeding Development

- Division of responsibility (Satter)
- Infants
  - Parent is responsible for what infant consumes
  - Infant is responsible for how much (and everything else)
- Infant transitioning to family food
  - Parent is responsible for what (become responsible for when/where)
  - Infant is responsible for how much and whether
- Toddlers-through-adolescents
  - Parent is responsible for what, when and where
  - Child is responsible for how much and whether
Typical Feeding Environment

- Baby/child present during family meals
- Baby/child plays with water/food/utensils/cups/dishes
- Baby/child observes family preparing food/eating food/enjoying food

Neurophysiological Development

<table>
<thead>
<tr>
<th>Homeostasis</th>
<th>Attachment</th>
<th>Individuation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-3 months</td>
<td>2-6 months</td>
<td>6-36 months</td>
</tr>
<tr>
<td>State regulation</td>
<td>&quot;Falling in love&quot;</td>
<td>Separation and differentiation</td>
</tr>
<tr>
<td>Parent provides safe</td>
<td>Affective</td>
<td>Behavioral organization and control</td>
</tr>
<tr>
<td>and comfortable</td>
<td>engagement</td>
<td>Parent supports autonomy and provides daily structure</td>
</tr>
<tr>
<td>environment</td>
<td>and interaction</td>
<td>Emotional needs/Physical needs</td>
</tr>
<tr>
<td>Neurophysiologic</td>
<td>Infant’s</td>
<td></td>
</tr>
<tr>
<td>stability</td>
<td>emotional/physical needs reinforced</td>
<td></td>
</tr>
<tr>
<td>Reflex feeding</td>
<td></td>
<td></td>
</tr>
<tr>
<td>transitions to self-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>regulation of hunger</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Neurophysiological Development

**Homeostasis**
- Feeding Related Cues: Arousal, crying, rooting, sucking
- Hunger-satiation patterns emerge
- Positive feeding interaction perpetuates future positive experience

**Attachment**
- Reciprocity between child and caregiver
- Feeding Related Cues: Anticipation, social pauses/satiety pauses, preference for feeder, attention seeking

**Individuation**
- The age of the individual
- Exploratory play, self-feeding emerges, speech and language development, follows simple directions, responds to "no"

Temperament Theory

- Categories of personality styles that persist through life
- Personality styles based on activity, adaptability, intensity, mood, persistence, distractibility, regularity, responsivity, approach/withdraw
- Relates to how individuals manage in relationship to novel situations

(Thomas et. al., 1970)
## Temperament Categories

<table>
<thead>
<tr>
<th>Easy</th>
<th>Slow to Warm</th>
<th>Difficult</th>
</tr>
</thead>
<tbody>
<tr>
<td>Approach to novelty:</td>
<td>Approach to novelty:</td>
<td>Approach to novelty:</td>
</tr>
<tr>
<td>Positive mood</td>
<td>Withdraws</td>
<td>Withdraws</td>
</tr>
<tr>
<td>Adaptable</td>
<td>Low mood</td>
<td>Low adaptability</td>
</tr>
<tr>
<td>Regular</td>
<td>Low activity</td>
<td>High intensity</td>
</tr>
<tr>
<td>Active</td>
<td>Moderate to low intensity</td>
<td>Low regularity</td>
</tr>
<tr>
<td>Low intensity</td>
<td>Cautious</td>
<td>Negative mood</td>
</tr>
</tbody>
</table>

## Quick Anatomy Refresher:
Anatomy

- Oral cavity
- Pharynx
- Nasopharynx
- Oropharynx
- Hypopharynx
- Larynx

Say “ahhh”
Oral Cavity

- Lips
- Mandible
- Maxilla
- Floor of the mouth
- Cheeks
- Tongue
- Hard palate
- Soft palate
- Anterior faucial arches
- Posterior faucial arches

Figure 4. Normal Structures of the Oral Cavity

Diagram with structures of the mouth labeled.

Pharynges

The pharynx, a common passageway for solid food, liquids, and air

Regions of the Pharynx
- Nasopharynx
- Oropharynx
- Laryngopharynx

Infant
- Potential Oral Cavity
  - Tongue fills mouth
  - Tongue rests more anteriorly
  - Sucking pads (up to 4-6 months)
  - Relatively smaller mandible
  - Obligatory nose breathers

Adult
- True Oral Cavity
  - Tongue does not fill mouth
  - Tongue rests slightly farther back than infant
  - Sucking pads are gone
  - Mandible is proportional

Anatomical Differences

Infant vs Adult
"A Picture is Worth A Thousand Words"
(Morris)

Infant

- Muscular tube lined with mucosa
- Cricopharyngeus (upper esophageal sphincter) (UES)
- Gastroesophageal sphincter (lower esophageal sphincter)

Adult
Where is the Esophagus?

- Anterior to the cervical vertebra
- Posterior to the trachea
- Between the carotid arteries
  - Recurrent laryngeal nerves flank the esophagus in the tracheoesophageal groove

Esophagus Visual

(Oh & DeMeester, 2016)
Typical Esophageal Function

- Consists of automatic peristaltic wave which carries bolus to the stomach
- Skeletal muscles in cervical esophagus propels food more quickly than the smooth muscles in the thoracic esophagus
- Primary wave goes from UES to LES in one contraction
- Esophageal phase occurs after each separate pharyngeal phase when there is a definite time delay between swallows

Typical Gastrointestinal Function

- Typical pattern of gastric motility and emptying is the end result of functional and complex interactions
- Food volume, viscosity, separate food content impact gastric function
- Acid clearance in distal esophagus
Reflexes, Phases & Norms

Phases of Swallowing

- **Oral Preparatory Phase** - Preparing food/liquid in the oral cavity to form a bolus
- **Oral Transit Phase** - Propelling bolus through oral cavity to posterior
- **Pharyngeal Phase** - Initiating the swallow, bolus moves through pharynx
- **Esophageal Phase** - Moving bolus through the esophagus
Typical Reflexes Associated w/Feeding

- **Root Reflex**: Stimulus presented near infant’s mouth resulting in head turn toward stimuli and mouthing/rooting
- **Suck Reflex**: Sucking in response to stimuli within oral cavity
- **Suck/Swallow**: When liquid is moved into the mouth, infant sucks/swallows
- **Tongue Thrust**: When lips are touched, infant protrudes tongue
- **Gag**: Solid object propelled forward and outward of infant’s mouth

Important Milestones

- Sucking develops in utero ~ 15-16 weeks gestation
- Swallowing develops ~ 14-17 weeks gestation
- Fetus swallows approximately 15 oz of amniotic fluid per day
- Suck, swallow, breathe synchrony emerges between 32-34 weeks
- Synchrony stabilizes ~ 37 weeks
### Newborn

#### Milestones

<table>
<thead>
<tr>
<th>Motor</th>
<th>Language/Social</th>
<th>Oral-Motor/Feeding</th>
<th>Food/Liquid Intake</th>
</tr>
</thead>
</table>
| • Physiological flexion  
• Strong grasp reflex | • Cry/vowel-like sounds primarily on exhalation  
• Clicks/friction noise | • Strong gag, root, phasic-bite-release  
• Suckles/sucks when hand comes to mouth  
• Sucks liquid from bottle and/or breast | • Exclusively accepts breast milk and/or formula |

### 1-2 Months

#### Milestones

<table>
<thead>
<tr>
<th>Motor</th>
<th>Language/Social</th>
<th>Oral-Motor/Feeding</th>
<th>Food/Liquid Intake</th>
</tr>
</thead>
</table>
| • Movement becoming more deliberate  
• Roles from side-to-back  
• Bicycles w/legs when excited  
• Hold objects briefly  
• Follows objects w/eyes | • May begin to respond to interaction w/cooing and light squeals  
• Holds eye contact w/caregiver  
• Beginning to smile | • Sucks liquid from bottle and/or breast  
• Semi-recline posture during feeding | • Exclusively accepts breast milk and/or formula |
### 2-3 Months

#### Milestones

<table>
<thead>
<tr>
<th>Motor</th>
<th>Language/Social</th>
<th>Oral-Motor/Feeding</th>
<th>Food/Liquid Intake</th>
</tr>
</thead>
</table>
| • Keeps head in mid-position in supine  
  • Raises head/chest in prone  
  • Sits w/support on lap | • Presents w/different cries  
  • Coos in response to interaction w/caregiver | • Sucks liquid from bottle and/or breast  
  • Gaze w/caregiver during feeding | • Exclusively accepts breast milk and/or formula |

### 3-4 Months

#### Milestones

<table>
<thead>
<tr>
<th>Motor</th>
<th>Language/Social</th>
<th>Oral-Motor/Feeding</th>
<th>Food/Liquid Intake</th>
</tr>
</thead>
</table>
| • Orientation of head, eyes, hand-to-midline initiated  
  • Supports self on forearms in prone  
  • Rolls from side-to-side on stomach  
  • Claps hands | • Babbles randomly | • Begins to place hands on the bottle when feeding | • Breast milk and/or formula  
  • May begin puree and cereal |
### 5-6 Months

**Milestones**

<table>
<thead>
<tr>
<th>Motor</th>
<th>Language/Social</th>
<th>Oral-Motor/Feeding</th>
<th>Food/Liquid Intake</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Increased head/neck control</td>
<td>• Rhythmical babbling</td>
<td>• Spoon feeding introduced</td>
<td>• Breast milk and/or formula</td>
</tr>
<tr>
<td>• Tracks visually</td>
<td></td>
<td>• Cup drinking introduced</td>
<td>• May begin puree and cereal</td>
</tr>
<tr>
<td>• Sits w/support</td>
<td></td>
<td>• Holds own bottle w/both hands</td>
<td>• May begin lumpy solids if began puree earlier</td>
</tr>
<tr>
<td>• Rolls over</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Hands to mouth</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### 6-9 Months

**Milestones**

<table>
<thead>
<tr>
<th>Motor</th>
<th>Language/Social</th>
<th>Oral-Motor/Feeding</th>
<th>Food/Liquid Intake</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Sits independently</td>
<td>• Jargon</td>
<td>• Posture is more upright during feeding</td>
<td>• Breast milk and/or formula</td>
</tr>
<tr>
<td>• Hand and toys to mouth</td>
<td></td>
<td>• Lips close on spoon</td>
<td>• Lumpy solids w/improved ability to manage harder lumps</td>
</tr>
<tr>
<td>• Crawling begins</td>
<td></td>
<td>• Accepts puree from spoon</td>
<td>• Finger foods begin (pieces of cereal, teething crackers, pieces of cooked pasta)</td>
</tr>
<tr>
<td>• Pincer grasp emerges</td>
<td></td>
<td>• Lingual lateral movement</td>
<td></td>
</tr>
<tr>
<td>• Begins finger feeding</td>
<td></td>
<td>• Munching pattern begins</td>
<td></td>
</tr>
<tr>
<td>• Object permanence</td>
<td></td>
<td>• Extracts liquid from cup</td>
<td></td>
</tr>
<tr>
<td>• Reaches</td>
<td></td>
<td>• Attempts to help w/the spoon</td>
<td></td>
</tr>
<tr>
<td>• Head/neck/trunk control</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
9-12 Months

Milestones

<table>
<thead>
<tr>
<th>Motor</th>
<th>Language/Social</th>
<th>Oral-Motor/Feeding</th>
<th>Food/Liquid Intake</th>
</tr>
</thead>
</table>
| • Pulls-to-stand  
  • Cruises  
  • First steps  
  • Attempts to  
    spoon feed self  
  • Pincer grasp  
    more refined  
  • Increased  
    mobility in  
    shoulders/arms  
| • Verbalizes 1-2  
  words  
  • Recognizes own  
    name  
  • Imitates familiar  
    sounds/sound  
    combos  
  • Vocalizes desire  
    to change  
    activities  
  • Understands  
    simple directions  
| • Drinks from a cup  
    held by caregiver  
  Accepts greater  
    variety of textures  
    (food)  
  • Increased finger  
    feeding  
  • Rotary chewing  
  • Purposefully reaches  
    for spoon  
| • Breast milk and/or  
    formula  
  • Fruit cut into  
    pieces  
  • Bite-size cooked  
    vegetables  
  • Combination  
    foods (mac and  
    cheese, casseroles)  
  • Cheeses |

12-18 Months

Milestones

<table>
<thead>
<tr>
<th>Motor</th>
<th>Language/Social</th>
<th>Oral-Motor/Feeding</th>
<th>Food/Liquid Intake</th>
</tr>
</thead>
</table>
| • Gross and fine  
  motor skills  
  maturing  
  • Walking  
    independently  
  • Climbs stairs (1- 
    step at a time)  
  • Runs  
  • Grasps objects  
    and releases  
    on request  
| • Vocabulary of 5- 
    20 words  
  • Shakes head  
    “no”  
  • Asks “what’s  
    that?”  
  • Asks for “more”  
| • Grasps spoon  
    w/both hands  
    for self-feeding  
  • Holds/drinks  
    from cup with  
    both hands  
  • Holds and tips  
    bottle  
    independently  
| • Whole milk  
  • Dairy  
  • Fruits  
  • Cooked  
    vegetables  
  • Small pieces of  
    meat and other  
    proteins  
  • Juice |
### 18-24 Months

**Milestones**

<table>
<thead>
<tr>
<th>Motor</th>
<th>Language/Social</th>
<th>Oral-Motor/Feeding</th>
<th>Food/Liquid Intake</th>
</tr>
</thead>
</table>
| • Kicks a ball  
• Walks backwards or sideways  
• Rides on small wheeled toys  
• Attention and play skills improve | • 2-word utterances  
• Uses 50 difference words  
• Makes animal sounds  
• Uses words to express wants/needs  
• Understands the word “no” | • Primarily self-feeds  
• Chews and swallows a wide range of textures  
• Oral movements are more efficient | • Whole milk  
• Dairy  
• Fruits  
• Cooked vegetables  
• Small pieces of meat and other proteins  
• Juice |

### 24-36 Months

**Milestones**

<table>
<thead>
<tr>
<th>Motor</th>
<th>Language/Social</th>
<th>Oral-Motor/Feeding</th>
<th>Food/Liquid Intake</th>
</tr>
</thead>
</table>
| • Runs without falling and can avoid obstacles  
• Pedals a tricycle | • Uses 3-word phrases frequently  
• Uses negation | • Holds cups w/one hand  
• Uses open cup without spilling  
• Places food on spoon with fingers  
• Uses fork to poke food  
• Wide range of solid foods | • Low-fat milk  
• Dairy  
• Fruits  
• Meat  
• Combo foods  
• Fruits and/or vegetables  
• Juice |
# Self-Feeding

**Milestones**

<table>
<thead>
<tr>
<th>Age (Months)</th>
<th>Skill</th>
</tr>
</thead>
</table>
| 6-9          | • Both hands used to hold bottle  
               • Finger feeding begins |
| 9-12         | • Finger feeding easily managed solids |
| 12-18        | • Grasps soon w/whole hand  
               • Holds and drinks from a cup w/2 hands  
               • Holds and tips bottle |
| 24-36        | • Holds and drinks from a cup using one hand  
               • Uses fingers to fill spoon  
               • Uses a fork |
| 36+          | • Helps w/simple meal preparation (stirring, scooping, pouring, setting table) |
Early Experiences and the Brain

- Most regions of the brain contain all of the neurons they will have by birth
- Ongoing process of wiring/re-wiring connections among neurons
- New synapses are formed through use/others that are unused are pruned away
- Over-pruning can occur when a child is deprived of normally expected experiences
Emotional Development and the Brain

- Infants have fundamental task of determining whether needs are met
- When adults are responsive the infant perceives them as a source of safety
- Infants who feel safe/secure can focus on exploring which allows the brain to develop

Early Experiences, the Brain and Eating

- Positive early experiences and Feeding
  - Communication acknowledged and needs met by caregiver = Safety/Security
  - Safety-Security = Infant/child who is free to experiment, explore, and practice
  - Experimentation, exploration, and practice = Reinforcing neuronal connections and overall function
Feeding Development: Disrupted

Factors that can Impact Typical Development

- Medical Diagnoses & Complications
- Developmental Diagnoses
- Temperament
- Psychosocial Diagnoses/Issues
- Nutrition Problems
- Environmental Factors
References


