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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 at the University of Louisville. She also received a stipend from OccupationalTherapy.com for this presentation.
Course Objectives

1. The learner will list the 3-step hierarchy of functions important to human beings in relation to feeding.
2. The learner will name 3 ways developmental readiness influences feeding progression.
3. The learner will 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
- Sounds
- 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</td>
</tr>
<tr>
<td>Parent provides safe</td>
<td>Affective engagement and</td>
<td>differentiation</td>
</tr>
<tr>
<td>and comfortable</td>
<td>interaction</td>
<td>Behavioral organization</td>
</tr>
<tr>
<td>environment</td>
<td></td>
<td>and control</td>
</tr>
<tr>
<td>Neurophysiologic</td>
<td>Infant’s emotional/physical</td>
<td>Parent supports</td>
</tr>
<tr>
<td>stability</td>
<td>needs reinforced</td>
<td>autonomy and</td>
</tr>
<tr>
<td>Reflex feeding</td>
<td></td>
<td>provides daily</td>
</tr>
<tr>
<td>transitions to self-</td>
<td></td>
<td>structure</td>
</tr>
<tr>
<td>regulation of hunger</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Neurophysiological Development

<table>
<thead>
<tr>
<th><strong>Homeostasis</strong></th>
<th><strong>Attachment</strong></th>
<th><strong>Individuation</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Feeding Related Cues-Arousal, crying, rooting, sucking</td>
<td>Reciprocity between child and caregiver</td>
<td>The age of the individual</td>
</tr>
<tr>
<td>Hunger-satiation patterns emerge</td>
<td>Feeding Related Cues-Anticipation, social pauses/satiety pauses, preference for feeder, attention seeking</td>
<td>Exploratory play, self feeding emerges, speech and language development, follows simple directions, responds to &quot;no&quot;</td>
</tr>
<tr>
<td>Positive feeding interaction promotes future positive experience</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### 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</td>
<td>low regularity</td>
</tr>
<tr>
<td>Low intensity</td>
<td>low intensity</td>
<td>negative mood</td>
</tr>
</tbody>
</table>

### Quick Anatomy Refresher:

**Infants/Children**
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
Pharynges

Anatomical Differences

Infant vs Adult

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
“A Picture is Worth A Thousand Words”
Images used with permission from Suzanne Evans Morris, PhD

Newborn

Adult

Esophagus

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

“How it all comes together.”

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 34-36 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>
<tbody>
<tr>
<td>• Physiological flexion</td>
<td>• Cry/vowel-like sounds primarily on exhalation</td>
<td>• Strong gag, root, phasic-bite-release</td>
<td>• Exclusively accepts breast milk and/or formula</td>
</tr>
<tr>
<td>• Strong grasp reflex</td>
<td>• Clicks/friction noise</td>
<td>• Suckles/sucks when hand comes to mouth</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Sucks liquid from bottle and/or breast</td>
<td></td>
</tr>
</tbody>
</table>

## 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>
<tbody>
<tr>
<td>• Movement becoming more deliberate</td>
<td>• May begin to respond to interaction w/cooking and light squeals</td>
<td>• Sucks liquid from bottle and/or breast</td>
<td>• Exclusively accepts breast milk and/or formula</td>
</tr>
<tr>
<td>• Roles from side-to-back</td>
<td>• Holds eye contact w/caregiver</td>
<td>• Semi-recline posture during feeding</td>
<td></td>
</tr>
<tr>
<td>• Bicycles w/legs when excited</td>
<td>• Beginning to smile</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Hold objects briefly</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Follows objects w/eyes</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### 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/cheek 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>
</table>
| • Increased head/neck control  
• Tracks visually  
• Sits w/support  
• Rolls over  
• Hands to mouth | • Rhythmical babbling | • Spoon feeding introduced  
• Cup drinking introduced  
• Holds own bottle w/both hands | • Breast milk and/or formula  
• May begin puree and cereal  
• May begin lumpy solids if began puree earlier |

### 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>
</table>
| • Sits independently  
• Hand and toys to mouth  
• Crawling begins  
• Pincer grasp emerges  
• Begins finger feeding  
• Object permanence  
• Reaches  
• Head/neck/trunk control | • Jargon | • Posture is more upright during feeding  
• Lips close on spoon  
• Accepts puree from spoon  
• Lingual lateral movement  
• Munching pattern begins  
• Extracts liquid from cup  
• Attempts to help w/the spoon | • Breast milk and/or formula  
• Lumpy solids w/improved ability to manage harder lumps  
• Finger foods begin (pieces of cereal, teething crackers, pieces of cooked pasta) |
## 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>
<tbody>
<tr>
<td>• Pulls-to-stand</td>
<td>• Verbalizes 1-2 words</td>
<td>• Drinks from a cup held by caregiver</td>
<td>• Breast milk and/or formula</td>
</tr>
<tr>
<td>• Cruises</td>
<td>• Recognizes own name</td>
<td>• Accepts greater variety of textures (food)</td>
<td>• Fruit cut into pieces</td>
</tr>
<tr>
<td>• First steps</td>
<td>• Imitates familiar sounds/sound combos</td>
<td>• Increased finger feeding</td>
<td>• Bite-size cooked vegetables</td>
</tr>
<tr>
<td>• Attempts to spoon feed self</td>
<td>• Vocalizes desire to change activities</td>
<td>• Rotary chewing</td>
<td>• Combination foods (mac and cheese,</td>
</tr>
<tr>
<td>• Pincer grasp more refined</td>
<td>• Understands simple directions</td>
<td>• Purposefully reaches for spoon</td>
<td>casseroles)</td>
</tr>
<tr>
<td>• Increased mobility in shoulders/arms</td>
<td></td>
<td></td>
<td>• Cheeses</td>
</tr>
</tbody>
</table>

## 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>
<tbody>
<tr>
<td>• Gross and fine motor skills maturing</td>
<td>• Vocabulary of 5-20 words</td>
<td>• Grasps spoon w/both hands for self-feeding</td>
<td>• Whole milk</td>
</tr>
<tr>
<td>• Walking independently</td>
<td>• Shakes head “no”</td>
<td>• Holds/drinks from cup with both hands</td>
<td>• Dairy</td>
</tr>
<tr>
<td>• Climbs stairs (1-step at a time)</td>
<td>• Asks “what’s that?”</td>
<td>• Holds and tips bottle independently</td>
<td>• Fruits</td>
</tr>
<tr>
<td>• Runs</td>
<td>• Asks for “more”</td>
<td></td>
<td>• Cooked vegetables</td>
</tr>
<tr>
<td>• Grasps objects and releases on request</td>
<td></td>
<td></td>
<td>• Small pieces of meat and other proteins</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Juice</td>
</tr>
</tbody>
</table>
### 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>
<tbody>
<tr>
<td>• Kicks a ball</td>
<td>• 2-word utterances</td>
<td>• Primarily self-feeds</td>
<td>• Whole milk</td>
</tr>
<tr>
<td>• Walks backwards or sideways</td>
<td>• Uses 50 difference words</td>
<td>• Chews and swallows a wide range of textures</td>
<td>• Dairy</td>
</tr>
<tr>
<td>• Rides on small wheeled toys</td>
<td>• Makes animal sounds</td>
<td>• Oral movements are more efficient</td>
<td>• Fruits</td>
</tr>
<tr>
<td>• Attention and play skills improve</td>
<td>• Uses words to express wants/needs</td>
<td></td>
<td>• Cooked vegetables</td>
</tr>
<tr>
<td></td>
<td>• Understands the word “no”</td>
<td></td>
<td>• Small pieces of meat and other proteins</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Juice</td>
</tr>
</tbody>
</table>

### 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>
<tbody>
<tr>
<td>• Runs without falling and can avoid obstacles</td>
<td>• Uses 3-word phrases frequently</td>
<td>• Holds cups w/one hand</td>
<td>• Low-fat milk</td>
</tr>
<tr>
<td>• Pedals a tricycle</td>
<td>• Uses negation</td>
<td>• Uses open cup without spilling</td>
<td>• Dairy</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Places food on spoon with fingers</td>
<td>• Fruits</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Uses fork to poke food</td>
<td>• Meat</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Wide range of solid foods</td>
<td>• Combo foods</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Fruits and/or vegetables</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Juice</td>
</tr>
</tbody>
</table>
# 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) |
Summary

How typical experiences impact the infant/child

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


Pearson Education. (2011). The pharynx, a common passageway for solid food, liquids, and air. Retrieved from http://2.bp.blogspot.com/-Dxd9K98SxG3i/U8MMgGVyfI/AAAAAAAAY7G/T2aZf96A/s1600/pharynx.jpg

