

Assessment & Intervention of Feeding in the Young Infant Part I

DARS ECI Webinar Series

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Considerations for Working with Young Infants

FEEDING SPECIFICS

Why not wait?

- Feeding is a developmental process
- Early experiences are key to long-term success
- When interrupted, children may demonstrate
 - Oral sensorimotor dysfunction
 - Undernutrition (FTT)
 - Poor growth
 - Delayed development
 - Poor academic achievement
 - Psychological problems
 - Loss of overall health and well-being
- Oral sensorimotor function, swallowing, & respiration coordination are important processes that relate to development of normal feeding, eating, and speech motor skills

Red Flags

- Oral-motor dysfunction
- Dysphagia
- Medical Hx of Dx leading to feeding disruption
 - BPD, RDS, cardiac, neuro impairment, GERD
- Supplemental tube feedings
- Failure to match diet/quantity to dev. age
- Poor meal scheduling
- Poor/inappropriate parental feeding strategies

Factors that Limit Feeding Skill Development

– Structural limitations

- Oral-Facial (Choanal Atresia, Cleft Lip/Palate, Micrognathia, Macroglossia, Dental Malocclusions, Short Lingual Frenulum)
- Gastrointestinal (Esophageal Stricture, Pyloric Stenosis, Esophageal Atresia, Anal Atresia, Tracheoesophageal Fistula, Congenital Diaphragmatic Hernia, Hiatal Hernia, Short Bowel Syndrome)
- Respiratory and Cardiac (Tracheomalacia, Laryngomalacia, Pulmonary Atresia/Stenosis, Aortic stenosis, etc.)

Factors that Limit Feeding Skill Development

– Physiological limitations

- Oral-Pharyngeal (aspiration)
- Gastrointestinal (Gastroesophageal Reflux-GER, Esophagitis, Esophageal Dysmotility, Achalasia, Stomach Motility disorders, Delayed Gastric Emptying, Dumping Syndrome, Chronic Intestinal Pseudo-obstruction, Hirschsprung's Disease, Diarrhea, Constipation)
- Respiratory-Cardiac (Bronchopulmonary Dysplasia, Scoliosis/Kyphosis, Hypotonia/Hypertonia, Congestive Heart Failure)

Factors that Limit Feeding Skill Development

– Environmental limitations

- Circumstances that impact child's feeding and mealtime skills related to socioeconomic or mental-health issues of the family
- Lack of resources (financial, personal)
- Frequent moving between cities results in inconsistent healthcare
- Inconsistent mealtimes and caregiving (lack of bonding with a primary caregiver, maternal depression, parents' own issues with food)

Effects of Intervention

- What we know:
 - Infant feeding is a function of both maturation & experience
 - Primitive mechanisms support early feedings but are then integrated, and feeding is solely a learned skill beginning at 4 months
 - Medically fragile infants are most at risk for feeding problems
 - Immaturity and medical instability increase likelihood of aversive feeding experiences
 - Experience directly builds brain pathways

Effects on Outcomes

- We make a difference!
 - To the INFANT:
 - By understanding development so that we adjust our expectations
 - By supporting organization of physiological, motor and behavioral states so that infants can interact and attend to experiences
 - By ensuring experiences are as pleasurable as possible
 - To the FAMILY:
 - By supporting them so they can nurture their infant

(Erin Sundseth Ross, Ph.D.)

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Why focus on feeding?

- In children with no known medical causes for failure to thrive or undernutrition, significant numbers were found to have oral-motor dysfunction that resulted in sucking, chewing, or swallowing difficulties

The impact of early feeding on later feeding skills is huge!

(Reilly, Skuse, Wolke, & Stevenson, 1999)

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Outcomes related to feeding

Preterm infants

- Many infants and children born preterm will require services for years to come, particularly for feeding
 - First, to learn to successfully feed orally
 - Later, to make a full transition to their families' diet
(Msall & Tremont, 2002)
- Approximately 31% of NICU graduates will experience feeding difficulties before one year of age
- 40% of children referred to an outpatient specialty clinic for feeding or growth concerns are former preemies (Hawdon, et al, 2002)

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Outcomes related to feeding

- An increasing number of those born preterm are referred for significant and persistent feeding problems:
 - Eating only limited types of food, difficulty transitioning to textured foods, food refusal



(Field et al, 2003; Hawdon et al, 2000; Rommel et al, 2003;

- Wood et al, 2003)

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Interactions with the Family

- Points to remember:
 - Be observant for high levels of stress, post-partum depression, pressure from family members
 - Ask open-ended questions to get clues as to the problem.
 - Parents may not know *what* to ask. Allow for misunderstanding.
 - Train parents/caregivers as primary feeders
 - Work with them to help their child so every feeding can be therapeutic, not just the ones conducted by the therapist
 - Take the time to treat the entire family to ensure support of proper feeding techniques by the primary feeder



OVERVIEW OF NORMAL ORAL MOTOR & FEEDING DEVELOPMENT

Effect of Overall Tone & Gross Motor Development on Feeding

- Looking at feeding and oral motor skills within the context of the whole body
- Everything is connected!
- Issues and patterns that affect normal motor development influence the mouth
- Development of stability: external sources of support to more internally controlled stability, becomes more dynamic



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Effect of Overall Tone & Gross Motor Development on Feeding

- Looking at feeding and oral motor skills within the context of the whole body
- Mobility develops from a proximal base of stability, moving toward more distal control
 - **Refined development of distal oral motor skills is affected if proximal stability is an issue**
 - **Oral stability is dependent upon development of neck and shoulder girdle stability, which are dependent upon trunk and pelvic stability**

Effect of Overall Tone & Gross Motor Development on Feeding

- Looking at feeding and oral motor skills within the context of the whole body
- The jaw is proximal to the distal lips, cheeks, and tongue
 - The ability to stabilize the jaw is a prerequisite for development of skilled and refined tongue and lip movements



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Effect of Overall Tone & Gross Motor Development on Feeding

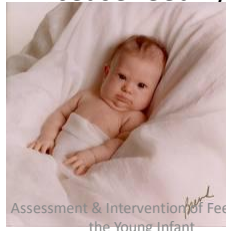
- Key points:
 - STABILITY (proximal) before MOBILITY (distal)
 - Stability- related to muscle tone & coordinated contraction of muscles
 - Mobility- performance of the motor acts
 - Normal movement = balance between stability and mobility

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Effect of Overall Tone & Gross Motor Development on Feeding

- Hypotonia

- Poor postural stability = decreased control of trunk, shoulders, head & neck
- Tries to compensate by “fixing” in a position or hyperextending (e.g., pulling back shoulders & extending jaw)
- Tires easily and will cease feeding before full



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Effect of Overall Tone & Gross Motor Development on Feeding

- Hypertonia

- All movements against increased tension/resistance of muscles
- Tends to fix spine & limit movements to small range
- Tire easily due to increased work

– ***HYPER or HYPO-tonicity = WEAKNESS***

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Prerequisites to Normal Infant Feeding

□ Rhythmicity

- Rhythm is the most consistent characteristic of feeding patterns during the first three months of life
- Newborns suck with a rapid, efficient, and regular movement
- Irregularities in the sucking rhythm have been identified as one indicator of brain dysfunction or damage in newborns
- Regular rhythm with a speed of 1 act/cycle per second is common in sucking and chewing patterns: tempo & rhythm of feeding patterns is similar to heel-to-toe gait in walking and the resting tempo of the heartbeat

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Prerequisites to Normal Infant Feeding

• Sensory System

- Normal development of the infant's sensory systems has a major impact on oral sensorimotor skills
- Mouth & hands have the highest number of sensory receptors per square inch of any other part of the body
 - Sensory receptors of the mouth are the earliest to emerge in fetal development
 - After birth, the infant seems to explore and learn predominantly by bringing everything to the mouth
 - Early mouthing activities provide the infant with abundant oral sensory input



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Prerequisites to Normal Infant Feeding

□ Sensorimotor Development

- Normal sensorimotor development
 - Based on a series of themes that fit most babies and an abundance of variations that fit each individual child
- Variations in movement experiences and opportunities are provided by caregivers
- Variations in feeding skills are based on availability of experience and child's unique characteristics
- Critically important for children to develop flexibility within their sensorimotor system that enables them to adjust to small variations in their environment

Coordination of Suck/Swallow/Breathe

- Breathing
 - Infants must stop breathing briefly with every swallow, lasting about one second
 - No agreement about when in respiratory cycle infant stops breathing
 - During continuous sucking, have a decrease in overall respiratory rate & lengthen expiratory phase /shorten inspiratory phase
 - Results in reduced ventilation > infant changes to intermittent sucking pattern

Coordination of SSB

- Sucking & Swallowing
 - Swallowing pattern related to flow and amount of liquid
 - Faster rate = swallow more often
 - Greater pressure suck = larger bolus & infant may have to adjust timing for initiating swallow
 - One suck per second, 1:1 ratio for suck:swallow
 - As infant nears 4-6 months, ratio may be 2-3:1
 - Newborn (healthy) baby – suck pattern will range from 10-30 sucking burst with 1:1:1 ratio of SSB

Reflex Integration

- Many reflexes present in full-term infant
- Integration occurs with maturity of cortical control
- Integration is not inhibition, but rather building of foundation for further refined skills

Normal Reflexes & Cranial Nerves

- Rooting • V, VII, XI, XII
- Gag • IX, X
- Phasic Bite • V
- Tongue Protrusion • XII
- Transverse Tongue Suckling • V, VII, IX, XII
- Swallowing • V, VII, IX, X, XII

Normal Reflexes & Integration

- Rooting • 3-6 months
- Gag • Diminishes at 6 months
- Phasic Bite • 9-12 months
- Tongue Protrusion • 4-6 months
- Transverse Tongue Suckling • 6-8 months
- Swallowing • Remains in adults

Nutritive vs. Non-Nutritive Suckling

- NUTRITIVE
 - At beginning of a feeding, infant sucks with continuous burst, then changes to more intermittent sucking bursts
 - One suck per second
 - Young (1-3 mos) infant swallows with 1:1 ratio, with 2-3:1 ratio toward end of feeding. Older infant ratio moves to 2-3:1 consistently due to larger oral cavity and decrease in fatty pads.
- NON-NUTRITIVE
 - Pattern is much more repetitive than with nutritive suckling
 - Six sucks per second
 - Ratio of 6-8:1 sucks to swallows

Compression vs. Suction

- Compression
 - Positive pressure phase
 - Hard palate and tongue
 - Precedes suction
- Suction
 - Negative pressure phase
 - Tongue latches with proper contact on nipple. Closed off system- jaw drops down and pulls fluid out (vacuum)

Integration of compression AND suction leads to efficient suck

Anatomical Supports

- Oral space is filled by the tongue, supporting compression/suction of breast or bottle nipple
- Oral structures are vertically compressed as well as the neck, shoulders, and head
- Buccal pads (fatty pads) provide stability
- Soft palate and epiglottis are in contact in posterior portion of oral cavity
- Epiglottis at C2, drops to C5-7 (3-4 mos)
- Larynx = 1/3 the size of adult

Tutor & Gossa, 2011

Cues for Readiness

- At least 34 weeks adjusted gestational age
- In quiet alert state for at least 5 minutes
- Shows “hunger cues”
 - Hands to mouth
 - Smacking
 - Tongue thrusting
 - Rooting
 - Non-nutritive sucking during gavage feeds
 - Crying (late hunger cue)
- Shows signs of physiologic stability such as:
 - Smooth and regular respiratory rate
 - Stable heart rate
 - Successfully demonstrates self regulatory behaviors
- Wakes before feeding time
- Demonstrates a sustained, rhythmical non-nutritive suck

Developmental Considerations

- Where is baby in process of development?
 - Development occurs in predictable fashion but on an individual timeline within parameters
 - Development is negatively influenced by medical comorbidities
 - Development influences the oral, pharyngeal, and esophageal phases of swallowing
 - *Every baby is an individual; you can't go by gestational week (if the baby was born early).*

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Developmental Considerations of Oral Phase

- Compression precedes suction (mouthing nipple)
- Integration of compression/suction = efficient suck
- If lack suction, likely one of following:
 - Developmentally in compression-only sucking pattern (immaturity)
 - Attempt to manage respiratory component of SSB by dropping suction
 - Neurologic/structural component
 - TEST? If can hold a pacifier in their mouth, are using suction- can rule out a neuro component

Mizuno et al., 2007; 2006; 2005; Craig et al., 2000; Eishima, 1991

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What We Know

- Infant feeding is a function of both maturation and experience
- Primitive mechanisms support early feedings but are integrated, and *feeding is solely a learned skill beginning at 4 months*
- Medically fragile infants are most at risk for feeding problems
- Immaturity and medical instability increase likelihood of aversive feeding experiences
- Experience *directly builds brain pathways*

Delaney & Arvedson, 2008

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Feeding Skills by Age

- **0-3 Months:** physiological flexion, suckle/swallow reflex, tongue, jaw & lips work as one unit, tongue movement in/out pattern, tongue is cupped to provide channel for backward movement of liquid, rooting reflex, phasic bite reflex, gag reflex



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Feeding Skills by Age

- **4-6 Months:** suckle in anticipation of spoon, munch-chew pattern (5-6 mo), tongue & jaw move as one unit, poor coordination of suck, swallow, breathing, rooting decreased by 5 months, phasic bite reflex decreased by 5 months, gag reflex



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Feeding Skills by Age

- **7-9 Months:** mixed tongue movements in/out & up/down, active lip movements for closure on bottle & cleaning spoon, unstable jaw during cup drinking, tongue protrusion on swallow, some jaw separation from tongue and lip during bite, transfer of food from side to center/center to side, lip closure for swallowing semi-solids, gag is slightly less sensitive



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BREASTFEEDING 101

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Anatomy & Physiology of Breastfeeding: Infancy & Puberty

- Infancy
 - Inverted nipples
 - Minimal glandular tissue
- Puberty
 - Breasts grow
 - Fat deposited
 - Milk ducts branch and grow
 - By age 20, breasts are finished growing, with exception of during pregnancy

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Anatomy & Physiology of Breastfeeding: Pregnancy

- Breasts grow
 - Milk glands enlarge and by 5 months begin to produce colostrum
- Nipple/Areola darkens and enlarges
- Nipple sensitivity increases
- More branching of milk ducts
- Increased growth of milk-making cells
- Breasts ready to make milk by 16th week of pregnancy
- Contents of breast milk include:
 - Protein
 - Fat
 - Cholesterol
 - Iron
 - Calcium
 - Carbohydrates
 - Vitamins & Minerals

How Breastfeeding Works

- Stages of Milk
 - Colostrum
 - Transition Milk
 - Mature Milk
- Foremilk vs. Hindmilk
- Lactogenesis II- increase in prolactin levels to stimulate milk making cells (alveolar cells)
- The “Let Down” or Milk Ejection Reflex
- SUPPLY & DEMAND

Latch-On & Positioning

- Good Latch
 - Flanged lips
 - Cheeks rounded
 - Circular movement of jaw
 - Audible swallowing
 - Breast Compression
 - Non-distorted nipple
 - Emptying of breast
 - Infant appears satisfied/full

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Latch-On & Positioning

- Bad Latch
 - Lips rolled in
 - Breast slides in and out of mouth
 - Baby only latches onto nipple only
 - Flattened/creased nipple
 - No breast changes after feeding
 - Inadequate stools and voiding

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Positioning

- Cradle Hold



- Cross-Cradle Hold



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Positioning

- Football Hold



- Side-Lying



Side-lying position

- Australian Hold



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Feeding Patterns

- Signs of hunger
- Sleep patterns
- How often do breast fed babies feed?
 - Demand vs. schedule feeding
 - First month (8-12x), 1-2 mos (7-9x)
 - Every 1 ½-3 hours, never longer than 4 hours
- Number of wet diapers/stools
 - 4-6 wet diapers, regular stools (3-4x per day, then less)
- Growth spurts (2-3 wks, 4-6 wks)

Common Problems that Impact Breastfeeding

- Sore Nipples
- Engorgement
- Flat/Inverted Nipples
- Plugged Ducts
- Mastitis

Additional Information

- Pumping/Storage
- WIC
- Medications
- Donating breastmilk/Milk banks

Storage of Breastmilk

	Temperature	Storage Time
Freshly expressed milk		
Warm room	73-77°F / 23-25°C	4 hours
Room temperature	66-72°F / 19-22°C	6-10 hours
Insulated cooler / icepacks	59°F / 15°C	24 hours
Refrigerated Milk (Store at back, away from door)		
Refrigerator (fresh milk)	32-39°F / 0-4°C	8 days (ideal: 72 hrs)
Refrigerator (thawed milk)	32-39°F / 0-4°C	24 hours
Frozen Milk (Do not refreeze! Store at back, away from door/sides)		
Freezer compartment inside refrigerator (older- style)	Varies	2 weeks
Self-contained freezer unit of a refrigerator/freezer	Varies: 0°F / -18°C	3-4 months
Separate deep freeze	0°F / -18°C	12 months (ideal: 6 months)

These guidelines are for milk expressed for a full-term healthy baby.

If baby is seriously ill and/or hospitalized, discuss storage guidelines with baby's doctor.

To avoid waste and for easier thawing & warming, store milk in 1-4 ounce portions.

Date milk before storing. Milk from different pumping sessions/days may be combined in one container – use the date of the first milk expressed.

Breastmilk is not spoiled unless it smells really bad or tastes sour.

QUESTIONS?

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