Feeding: How hard can it be?
An infant's perspective

The act of oral eating is the most complex task of infancy and is influenced by multiple co-related factors and driven by a maturational process (McGrath & Braescu, 2004).

“Successful oral feeding requires that children have functional oral sensorimotor and swallowing skills, adequate pulmonary and gastrointestinal function, central nervous system integration and normal musculoskeletal tone” (Udall, 2007).

“Eating requires active effort by infants who must have exquisite timing and coordination of simultaneous breathing, sucking and swallowing” (Udall, 2007).

During this Presentation

• Explore some of the challenges making feeding difficult
• Non-oral to Full oral feeding continuum
• Ready to feed cues & not ready to feed cues
  • Babies
  • Older infants
• Strategies
  • Positioning
  • Suck/swallow/breathing coordination
  • Desensitization
  • Texture Progression

Neurological

• Immaturity
• Abnormality

Aspiration

• Can result from primary dysfunction or S/S/B incoordination
• Ascending or descending
• Can be related to fatigue
• Silent

<table>
<thead>
<tr>
<th>Hypotonic</th>
<th>Normal</th>
<th>Hypertonic</th>
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<tbody>
<tr>
<td>Non-Responsive</td>
<td>Hyposensitive</td>
<td>Normal</td>
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Cardio-Respiratory

• Endurance
• Suck/Swallow/breathing coordination

Breathing –
How Hard Can It Be?

• It takes 26 muscles & 6 Cranial Nerves to coordinate a swallow
• Every time we swallow we stop breathing for a second
• Timing is everything

Breathing - How hard can it be?

• Weak and immature infant
• Medically fragile infant
• Chronic lung disease
• Airway maintenance issues:
  • Stenosis
  • Tracheo or laryngo malacia

Structural

• Cleft lip and palate
• Vocal cord involvement
• Tracheosophageal fistula
• Short gut syndrome
• Many others ….
Definitions of terminology

<table>
<thead>
<tr>
<th>Vomiting</th>
<th>Forceful oral expulsion of gastric contents associated with contraction of the abdominal and chest wall musculature</th>
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<tr>
<td>Regurgitation</td>
<td>The act by which food is brought back into the mouth without the abdominal and diaphragmatic muscular activity that characterizes vomiting</td>
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<tr>
<td>Retching</td>
<td>Spasmodic respiratory movements against a closed glottis with contractions of the abdominal musculature without expulsion of any gastric contents, referred to as “dry heaves”</td>
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Gastroesophageal Reflux (GER)

"Gastroesophageal reflux is the spontaneous return of gastric contents into the esophagus."

(Wolf and Glass et al.)

Mechanism:
- recurrent, inappropriate relaxation of the Lower Esophageal Spincter (LES)
- changes in pressure gradients between abdomen and thorax

GER can be visible or silent

Uncomplicated GER
- Effortless, painless vomiting
- Child appears well with normal growth
- Referred to as “Happy Spitter"
- Recurrent vomiting due to GER ↓ over first year of life and may resolve by 12 months of life

Gastroesophageal Reflux Disease (GERD) Clinical Manifestation
- Vomiting
- Poor weight gain (FTT)
- Dysphagia
- Abdominal or substernal pain
- Esophagitis → feeding refusal
- Respiratory disorders
- Neurobehavioral symptoms: irritability, sandifer syndrome
- Hematemesis
- Anemia

Diagnostic Studies

Upper GI (barium swallow)

*neither sensitive nor specific for the diagnosis of GER
No reflux on UGI does not = No Reflux
Can not detect Esophagitis (requires endoscopy & biopsy)
Purpose is to rule out:
Malrotation, strictures, pyloric stenosis, Hiatal hernia, annular pancreas in vomiting infant.

* UGI is just one example of a diagnostic test used in assessing an infant with vomiting.
Management may involve
- Ruling out over feeding
- Promoting feeding on demand (volume & frequency)
- Ruling out constipation
- Ruling out allergy as cause of vomiting
- Positioning - elevated, held upright post feedings, careful positioning for diaper changes, positioning in infant seat

Careful burping position

Management may involve
- Thickened feedings
- Medication
- Surgical- fundoplication

Acquired Oral Aversion
- Esophagitis- related to GERD
- Intubations, suctioning
- Flooding
- Aspiration
- Forced feeding

Developmental Transitions
- Sucking transition
  - Reflective → volitional
- Anatomical structure changes
  - Term infants- fat pads disappear at 3 months of age
  - With elongation some of mechanical advantage of close proximity of oral structures is no longer present at 4-6 months of age

Oral control of liquids can reduce as fat pads disappear and during transition to more volitional movements Oral loss while bottling may occur briefly during this transition.

Oral Eating
Ready or Not
Or Both!
Stages of Oral Feeding Protocol

### Pre-Oral Stage
- **Intervention** = No oral feeding
  - Tube feeding only
  - Developmental care
  - Positive experiences to face
  - Support lactation

### Non-Nutritive Sucking
- **Interventions:**
  - Facilitate hand to mouth
  - Nuzzling @ pumped breast
  - NNS
  - NNS with tube feeding

### Non-Measurable to Minimal Oral Intake (Stage I)
- **Interventions:**
  - Prevent distress
  - Minimize stimuli
  - Positioning
  - NNS
  - Therapeutic tasting
  - Breastfeeding prep
  - Bottle feeding prep

### Oral Feeding with Enteral Supplement (Stage II)
- **Interventions:**
  - Monitor readiness & disengagement/distress cues
  - Optimal positioning
  - Ambiance & prep
  - External pacing
  - Do not jiggle or rotate nipple
  - Strategies for positive tube feedings
  - Track daily % oral vs tube

### Total Oral Feeding (Stage III)
- **Interventions:**
  - Transition to cue-based feeding
  - Delay oral feed for disengagement/distress
  - Consider no "top up"
  - Encourage breastfeeding
  - Use home nipple
  - Ideal = ≥3 days cue-based feeding
Infants ready to feed video

Infants not ready to feed/stress cues video

Role of tube feeding

- Support growth while child is building skills and endurance
- Remember tube feedings are meals too
  - Feedings should not be rushed
    - same time as an oral meal
- Burp breaks

Strategies for S/S/B incoordination
Bottle and Breast

Positioning

Postural stability to support breathing and feeding:
- pillow
- side-lying, elevated
- hips flexed
- arms midline
- sniff position - good airway

Other Positioning

- Enface bundled
- GER
- Airway weakness e.g. Laryngomalacia
- May need angled bottle
Intervention - chin/cheek support

How and when
• Support vs manipulation
• Baby must be able to maintain SSB

Caution: This intervention improves latch and expression of milk and baby may not be able to keep up with swallowing. We fixed one problem but created another.

Intervention – Nipple Selection
Managing flow rates

• Check flow rate after heating
• Variety of slow flow nipples Examples:
  • Born Free
  • Gerber slow flow
  • Dr. Brown
  • The Special Needs Feeder
  • The Mini Special Needs Feeder (Haberman)
  • Playtex Advance/Ventaire
  • Playtex Drop Ins

Managing flow rates

• Thickened feedings
  • Simply Thick
  • Rice Cereal

Breastfeeding- managing flow rate

• Express prior to feeding
• Nipple shield

External Pacing

For babies prone to flooding and/or vagal response:
• Desaturation, apnea or bradycardia with feeding
• Poor SSB coordination
• Strong suck but poor SSB coordination
• Poor endurance

External Pacing
External Pacing

- Anticipate!
- After the initial 1-2 sucks
  - (for some babies)
- Continue until baby has slowed his sucking rate

External Pacing

When:
- Beginning of feeding until baby slows sucking rate
- Beginning of feeding and for a few bursts after each burp or rest break
- Beginning and again near end of feeding as baby fatigues
- Throughout the entire feeding

External Pacing

Early stress cues indicating need for external pacing:
- Baby starts to squirm
- Eyes brightening or worried look
- Milk trickles from mouth

External Pacing

Pacing is too late if:
- Nasal flaring
- Tracheal tug
- Panting
- Coughing
- Desats
- A & B

Introduction of Purees/Cup Drinking for the orally hypersensitive Child

- Bottle feeding/breastfeeding not established
- Some infants don’t have sucking skills or coordination to establish bottle/breastfeeding and do better with purees and thickened formula by small open cup
- Some infants are orally aversive to bottle and breastfeeding
- Aversion to approaching spoon

Introducing Purees

Positioning
- Head/neck support
- Trunk support
- Seat Depth
- Elevate to raise for proper tray height
- Importance of tray
- Postural support
- Respiratory Support
- GER Management
Hyper-sensitive Responses

- Response is exaggerated in magnitude for stimuli
- Won’t look at food or touch food with hands
- E.G. gagging with tip of tongue touched
- Defensive but will engage in oral activity in their limited range

Aversive Responses

- Stronger negative response
- Child may cry, grimace, arch, turn away, clamp mouth shut when asked to feed
- Aversive responses may result even with visual presentation of utensil
*Hypersensitive and aversive reactions can be localized to mouth or part of a global tactile problem
- Taste, temperature, textures, smells

Tactile Interaction- Hands

- Hands are the gate keepers of the mouth
- Children who won’t touch the food item likely won’t allow it in their mouth
- For some children wet foods are too challenging—may need to start with dry foods
- Clearing the tray
  - motivation to touch something is to get rid of it
  - Child picks up items to hand to parent
  - Child picks up items to put in a ‘clean up bucket’

Getting Messy!

- Some aversive children: will need to start with a utensil between them and the wet puree- e.g. spoon, Nuk brush
- wearing mitts- gradually cut away tips of gloves
- Whip cream in zip lock bag
- Touch cloth that is on top of food and squish or pick up with cloth

Tactile Exploration- Hands

- Getting messy and staying messy until end of meal—sometimes biggest challenge is for the parents
- Progression from finger tips only to entire hand
- Children with motor compromise will need guided assistance
- May take accidental tastes

Tactile Exploration- Hands

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Oral Exploration

- Mouthing experiences
  - Builds experience, trust and skill
  - Promotes Sensory and motor skills
  - Chewy toys
  - Soft spoons
  - Nuk brush (not for use with biters)
  - Hard Safe Foods as Teethers (eg. long spare rib bones, peeled whole carrot, Tough Sour Dough Crusts) – caution if has teeth as could be choking hazard

Oral Preparation

- Toothbrushing
- “1-2-3 all done” approach (Marsha Dunn Klein)
- Finger toothbrush (eg. infadent)
- Nuk Brush
- Face cloth
- Vibrating toothbrush

Approaching the Mouth

- Sensory based approach for hypersensitive children
  - For some- Allow long warm up of exploring food and utensils with hands first
  - Get permission approach (Marsha Dunn Klein)
    - Watch for the Positive and Negative Tilt
  - Giving Foods a Kiss
    - Offering taste from finger instead of spoon
    - Offering a kiss from the back of the spoon (less threatening then seeing a spoonful of food head on)

Approaching the Mouth

- Deliver purees or liquids just to the lip so child can invite it into the mouth
  - Small open cup resting on lip better then sippy cup where spout enters mouth
  - Thickening liquids with rice cereal, strained fruit, yogourt etc. slows the flow rate
  - Trickling liquids from a straw onto lip (pipette method)
  - Spitting is a functional skill- gives child control
  - Once children learn to spit, gagging → regurgitation often diminishes

Texture progression- Sensory

- Purees
  - Texture- Thin to thick
  - Flavour- work on variety and then progress bland to spicy- dips and sauces also work well at this stage
  - Temperature- warm to chilled

Supporting child’s reaction to change

  Instead of saying “that was yucky”
  Say “Wow that was a big taste”

Texture Progression

- Even at Purees stage – hard solid that won’t crumble is good for oral desensitization
- Biscuit can be used to dip in purees and lick off
Texture Progression

- Purees to Mashed Table foods
  - Works better than Junior texture (smooth puree with an unwelcome surprise lump)
  - Soft mashed fruit (e.g., bananas)
  - Soft mashed vegetables (e.g., sweet potatoes)
  - Soft mashed fine to soft mashed lumpier
  - “Around the Bowl” - Marsha Dunn Klein
  - “Ice Cube” Transitions - Marsha Dunn Klein

Texture Continuum

- Binder foods to scatter foods
- Binder foods
  - Mashed potatoes, mashed bananas
- Scatter foods
  - Crumbs - tried separately or added to puree Cut up table foods
  - Soda crackers shatter when eaten
  - Pretzels are harder but shatter when eat

Easily Dissolvable

- Can be introduced at smooth puree stage
- Place at front of mouth at side to avoid landing on center of tongue
- Use sips of liquids to keep mouth moist and flush residue

Sensory Summary

- Trust - child must trust self and trust caregiver to respect cues
- Gradual progression
- Get messy – Hands are gate keeper
- Oral desensitization
- Invite food and liquids into mouth
- Give foods a kiss

Sensory Summary

- Spitting is good
- Use sips of liquids throughout the meal to keep mouth moist and flush food residue
- Motivation is curiosity not appetite especially for children who are aversive and are receiving tube feeding supplementation
  - Curiosity → oral intake → ↓ tube feeding → appetite
  - How to Say “Have another bite” with out saying “Have another bite” - Marsha Dunn Klein

Hyposensitive Responses

- May require large amount of stimulus → response
- Quality of oral motor control and feeding may be impacted but feeding may be functional
- May have inadequate lip closure, trouble forming bolus or handling bolus
- Swallowing difficulty - bolus formation +/- or poor trigger of swallow (↓ pharyngeal sensitivity)
**Hypo-sensitivity**

- Can interfere with development of sucking, swallowing, biting and chewing
- Difficulty initiating or sustaining movement patterns and control
- Unaware of food in mouth and overfills to increase sensory information Food may scatter and remain in mouth several hours after a meal
- Hypo reactions can be perceived as lack of interest
- Fatigue easily and lose interest in challenging food

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**Sensory Strategies for Hyposensitive Child**

**Oral alerting activities (Wake up mouth & Face)**
- Wipe face briskly with cool/cold cloth
- Finger tapping on face
- Hand tapping cheeks
- Lip tapping
- Gum massage - Infadent or Nuk brush
- Vibration

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**Oral Alerting Tastes**

- Well seasoned, spicy, sour, cold, bitter, salty or sweet e.g. Salsa, lime juice, pickles, garlic
- Sip of iced drink after every few spoonfuls can act as a ‘wake up call’

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**Oral alerting textures**

- Crunchy foods
  - Sandwiches make on toast or crackers
  - Dry cereal with glass of milk on the side
- Add crunch to smooth foods
  - Rice crispies, Grapenuts
  - Graham wafer crumbs to pudding, soda cracker crumbs to soups or soft casseroles
- Wake up drinks
  - Carbonated water added to juice

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**Dental Problems**

- Breastfeeding/Baby bottle decay
- Oral motor compromise - poor bolus formation → scatter of food and retention of food residue
- Dry mouth (side effect of medication, mouth breathing) → inadequate saliva to cleanse teeth and neutralize acid
- GER → dental erosion and decay
- Oral hyposensitivity/aversion → difficulty with oral care and dental check ups
- Neuromuscular impairments → NPO
  - ↑ risk of aspiration pneumonia due to poor mouth care/dental problems as it ↑ bacteria in saliva and ↑ bad bacteria in saliva

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**When to see dentist**

- The Canadian Dental Association encourages the assessment of infants by a dentist within six months of the eruption of the first tooth or by one year of age. "Your child needs to see the dentist by age two or three, when all the baby teeth have come in," says the CDA.
- www.cda-adc.ca
**Dental Health**

- Nutritionally balanced diet for well formed, decay resistant teeth and healthy gums
- Structuring mealtimes to avoid grazing and going to bed with a bottle or falling asleep breastfeeding
- Oral hygiene - gum/tooth brushing desensitization programs - start early

**Oral Preparation**

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**Acknowledgements**

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http://www.calgaryhealthregion.ca/program/neonatology/Protocols/Patient_DVD_order_form_April_2009.pdf

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