

## Tips, Techniques and Tools for Managing Dysphagia in Children

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## How big a problem is pediatric dysphagia?

- Estimated reports of the incidence and prevalence of pediatric feeding/swallowing impairment vary widely due to multiple factors, such as variations in the populations sampled, how feeding and/or swallowing impairment is defined, and the choice of assessment methods and measures (Arvedson, 2008; Lefton-Greif, 2008)

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## Much less research to provide evidence in pediatrics compared to adults

### Why?

- Lower incidence problem in children than adults, thus fewer "subjects"
  - Or is it that many feeding problems are not reported/identified?
- More challenging to get pediatric studies through IRB
- Any long-term studies have to deal with the fact that the "subjects" are continuing to grow and develop, which makes it harder to measure impact of the intervention
- Much of the research in pediatrics is single case studies, which makes it hard to draw conclusions

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Systematic Reviews pull together information and are a good place to start



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## Theory-driven approach

- Theory-driven approach: An approach to treatment that makes sense given what we know about anatomy, physiology, normal feeding/swallowing development, swallowing function, etc.
- Do SLPs treating peds rely too much on what "should" work rather than searching the literature to find out if it "does" work?

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## Example of a lack of evidence

- Low-level evidence* (primarily expert opinion) that oral motor therapy improves specific oral motor skills (Wilcox, Potvin, & Prelock, 2009)
- Despite expert recommendations to use oral sensorimotor interventions with children with neurological impairment and dysphagia, there is *insufficient high-quality evidence* to support effectiveness (Morgan, Dodrill & Ward, 2012)

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## Good evidence found for key factors for positioning older children

- Goal – Most function with the least support/restriction
  - Stable pelvis in neutral position
  - Supported feet!
  - Neutral or slightly flexed head
  - Arms forward and free to move

Joanna Briggs Institute, 2009 (BEST Evidence Statement)  
Sieder, Majnemer, & Daraskis, 2013 (systematic review);  
Stavness, 2006; (systematic review);  
Hulme, Gallacher, Walsh, Nissen, & Waldren, 1987

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## ARFID

- There is *expert opinion* that sensory-based interventions are effective at improving number and variety of accepted foods in children with sensory processing issues
- But what does the literature tell us?

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## Pediatric Feeding Disorders:

A Quantitative Synthesis of Treatment Outcomes

- All studies involved **behavioral intervention**
- No well-controlled studies evaluating feeding interventions by other theoretical perspectives or clinical disciplines met inclusion criteria
- Results indicated that **behavioral intervention** was associated with significant improvements in feeding behavior.
- Sharp et al 2010

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## Applying EBP to pediatric dysphagia

- Blend solid knowledge with evidence
- Before continuing to use something that “should” work, search the literature to see if it has been shown to work
- Use a theory-driven approach when evidence is lacking
- Discontinue using things we “thought” worked, but research has shown don’t work

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## Challenges to treating dysphagia in children

- A variety of etiologies, and often they are not well defined
- Development and growth means we are aiming at a moving target
- They’re not little adults
- Without caregiver involvement, little chance of success

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## Challenges...

- Can’t watch a child eat and know what to treat
- Developing a plan to improve the child’s ability to “eat” or “swallow” is a narrow focus
- A team approach involving all adults in the child’s environment most effective

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## Isolated feeding vs. total oral motor

- Total program of oral motor development means feeding is a secondary goal
  - Morris & Klein
  - Arvedson & Brodsky
  - Alexander

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## Components of total oral motor approach

- Improvement in child's ability to control oral motor skills
  - changing the physical environment and stimuli in environment
  - changing child's position
  - Exercises and techniques for the oral mechanism (that's tomorrow)

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## Components of total oral motor program

- Food presentation changes
  - texture and temperature of food
  - timing of when food is presented
  - amount and size of bolus

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## What's "normal" in development of feeding skills?

- Infant's sucking Bottle/breast
  - 1:1:1 suck:swallow:breathe pattern
    - At end of feeding may change to 2:1 or 3:1
  - As infant matures, changes to 2,3 sucks:swallow
- Nutritive sucking
  - Initial continuous burst at least 30 seconds (maybe as long as 60-80 seconds)
  - As infant gets full, fewer sucks in each burst and longer pauses

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## What's "normal" in development of feeding skills?

- Fluid expression
  - Make sure infant isn't working too hard, or that fluid is coming too fast
- Anterior loss
  - Small amount of loss normal
- Endurance
  - Typical feeding is 20 minutes in length

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## What's "normal" in development of feeding skills?

- Birth to one month
  - 2-6 ounces (56-168cc) per feed
  - 6 or more feedings/day
- 5 months
  - 9-10 ounces
  - 4-6 feedings/day
- Three months
  - 7-8 ounces
  - 4-6 feedings each day
- 7 months
  - 11 or more ounces (food/liquid)
  - 4-6 feedings/day

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### What's "normal" in development of feeding skills? Spoon feeding

- Begins at 3-4 months
- Initially uses suckling pattern as food touches lips
  - Some food is pushed back out of the mouth
- At 6-7 months, waits quietly when sees spoon approaching
- 8 months, upper lip should touch spoon and help remove food
- 9 months, more mature sucking pattern
  - Up and down pattern
  - Occasional anterior loss
- 12 months tongue tip elevated at times
- 18 months no protrusion pattern

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### What's "normal" in development of feeding skills?

#### Spoon feeding

- 15 months, child can clean lower lip with top teeth
- 24 months, child can lick lips clean
- Amount consumed?
  - 4-6 months
    - One small serving cereal daily
  - 6-8 months
    - 2 servings cereal
    - 1 fruit
    - 2 vegetables
  - 8-12 months
    - 2-3 cereal
    - 2 fruits
    - 2-3 vegetables
    - 2 meats

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### What's "normal" in development of feeding skills?

#### Cup

- 6-8 months
  - Suckling pattern, or mix of suckling and suckling
  - May open mouth very wide
- 12 months
  - True sucking pattern
  - Opens jaw just wide enough
  - May place tongue under cup to stabilize
  - Some anterior loss still normal
- 18 months
  - Upper lip closes on edge of cup
- 24 months
  - Very coordinated up-and-down sucking pattern with cup between lips

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### What's "normal" in development of feeding skills?

#### Biting and chewing

- 5 months
  - Primitive phasic bite and release pattern
- 7-9 months
  - Can move food from side to center or center to side
  - Diagonal/rotary chewing pattern emerging
  - Lips appear active during chewing
- 10-12 months
  - Controlled bite on soft cookie
- 13-15 months
  - Controlled bite on harder substance
- 16-18 months
  - No food pushed out of mouth
- 19-24 months
  - May transfer food across one side, through midline to other side

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## So that's "normal"

- Just a bit about types of abnormal
- What is a feeding and swallowing disorder?
- Description of types of feeding disorders
- Evans Morris & Klein (2008)

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## Differential Diagnosis

- Motor-Based
- Sensory-Based
- Structurally-Based
- Experientially-Based

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## Motor-based

- Difficulty with:
  - postural tone and movement
  - Coordination and timing
- May have difficulty with sensory system as their limited motor skills have limited ability to interact with environment
- Example: Down Syndrome, Cerebral Palsy

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## Sensory-based

- Impaired sensory systems do not support processing of info required for eating and drinking
- May have specific cranial nerve damage(e.g. visual)
- Most have difficulty integrating sensory input
- May have muscle tone/coordination issues
- Example: Autism spectrum

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## Structurally-based

- Structural problems of face and mouth (cleft palate)
- Physiologically-based GI problems
- Children may have had multiple surgeries or procedures
  - May have lasting sensory deficits related
  - May have missed the critical period

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## Experientially-based

- Often called behavioral or food selectivity & refusal
- May have underlying impairments in physical, sensory or structural skills but main reason for feeding disorder is behavioral choices they make
  - Evan Morris & Klein say the children make these choices “to feel safe, comfortable or accepted” p. 191

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## Not that cut and dried

- Some children present with combination feeding problems
  - Sensory-based problem turns into experientially-based
  - Motor-based problem limited exposure to textures and results in experientially-based

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## Motor based

- This seminar focuses on sensori-motor based feeding disorders in children

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## Evaluating children with feeding disorders

- Oral-motor development
- Ability to maintain nutrition and hydration
- Relationship and interaction between care giver and child
- Medical and/or neurological problems affecting the child

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## Why are children referred?

- Sucking and swallowing incoordination
- Weak suck
- Feeding apnea
- Gagging/coughing
- Failure to thrive
- Irritability
- Recurrent pneumonia
- ? Aspiration
- Lethargy
- Food refusal
- Vomiting
- Lengthy feeding

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## Evaluating children with feeding disorders

- Oral-motor development
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## Multi-disciplinary evaluation

- SLP
- Physician
- Occupational Therapist
- Nurse
- Dietitian
- Physical Therapist
- Specialists

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## Feeding Evaluation Kit

- Things from home
  - Bottles
  - Cups with lids
  - Plates
  - Spoons
  - Bowls
  - Bib
- Things in kit
  - Variety of cups
  - Plate
  - Bowl
  - Variety of spoons
  - Fork
  - Straws

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## Obtaining a case history

- Medical history
- Sleep patterns
- Feeding patterns
- Feeding concerns reported

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## Structure/Function

- Trunk
- Head control
- Jaw
- Lips
- Tongue
- Cheeks
- Palate
- Gums/Teeth
- Respiration
- Hypersensitivity

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## Feeding Observation

- |   |   |
|---|---|
| <ul style="list-style-type: none"> <li>• Normal reflexes           <ul style="list-style-type: none"> <li>– Rooting(should disappear between 3-6 months)</li> <li>– Suckle-swallow</li> </ul> </li> </ul> | <ul style="list-style-type: none"> <li>• Abnormal reflexes           <ul style="list-style-type: none"> <li>– Tonic bite</li> <li>– Jaw thrust</li> <li>– Tongue retraction</li> <li>– Tongue thrust</li> <li>– Overactive gag</li> </ul> </li> </ul> |
|---|---|

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## Feeding Observation

- Position during feeding
  - supine with head elevated
  - prone
  - side lying
  - reclined/elevated
  - seating device:
  - supine unsupported

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## Feeding observation

- Cup
  - Suckle or suck (6-8; 12 mos)
  - Extension/retraction pattern
    - (6-8; gone by 12 mos)
  - Anterior loss (gone by 12 mos)
  - Jaw grading (6-8; gone by 12 mos)
  - Stabilizes cup by.... (12 mos.tongue; 18 mos bite)
  - Upper lip on edge of cup (18 mos)
  - Up & down sucking (24 mos)

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## Feeding observation

- Spoon
  - Suckle (begins at 3 mos)
  - Waits quietly for spoon (6-7 mos)
  - Lips assist in food removal (8mos)
  - Moves food posteriorly(4 mos loss;9 mos up/down; 12 mos tongue tip up; 18 mos no extension/retraction of tongue)
  - Cleans lower lip with teeth (15 mos)
  - Licks lips (24 mos)

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## Feeding Observation

- Bite/Chew
  - Phasic bite/sustained bite (5; 10-12; 13-15 for hard)
  - Moves food to chewing surface (7-9)
  - Moves food one side to the other (19-24)
  - Tongue thrust (abnormal by 16-18)
  - Tongue retraction (abnormal 16-18)
  - Lips active during chewing (7-9)

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## Feeding Observation

- Response to feeding
- Control of oral secretions
  - by 6 months, should drool only rarely in supine, prone, sitting
- Pharyngeal symptoms

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## Response to compensations

- Note what you tried with the child to compensate for difficulties
- Note child's response to these compensations

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## Making recommendations

- |                    |                            |
|--------------------|----------------------------|
| • Positioning      | • Stress signals           |
| • Utensils         | • Pacing                   |
| • Feeding Schedule | • Other evaluations needed |
| • Environment      |                            |

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## History taking

- What's important to learn before you evaluate the child?

- Cases in Word

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## Getting ready to treat the child

- Before treatment of the oral motor and/or feeding problem begins.....
  - conducive environment
  - positioning and movement

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## Creating a conducive environment

- Children may need to be alerted or calmed
  - before the interaction begins
  - during the interaction in response to signals the child is sending

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## Use of movement/touch

- ALERTING
  - rough textures
  - warm and cold stimuli
  - light tickles
  - vibration
  - textured foods
  - cold foods
- CALMING
  - stable positioning
  - slow rocking or bouncing
  - heavier utensils
  - textured foods
  - deep pressure to limbs and trunk

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## Use of taste/smell

- ALERTING
  - sharp tastes (sour, bitter, salty, sweet)
  - herbs and spices
  - unique smells
- CALMING
  - eliminate sour or bitter tastes

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## Use of visual input

- ALERTING
  - bright colors
  - shiny objects
  - moving objects
  - movement in peripheral vision
  - contrast color and shape
- CALMING
  - neutral colors
  - dull objects
  - eliminate moving objects

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## Use of auditory input

- ALERTING
  - unexpected or loud noises
- CALMING
  - soft, repetitive sounds
  - music with slow tempo and regular rhythm

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## Stability, Mobility and Tone

- Stability occurs in proximal areas of body (trunk, shoulder, girdle so that..
- Mobility can occur in distal areas (e.g. mouth, hands)
  - Bahr 2001
- Stability related to muscle tone and coordinated contraction of the muscles
- Working on the “core” increases stability

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## Stability, Mobility & Tone

- Mobility is performance of motor acts
- Normal movement occurs when there is balance b/t stability and mobility
  - Evans Morris & Klein 2000

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## Stability, Mobility & Tone

- Child with hypotonia has poor postural stability with decreased control of trunk, shoulders, neck
- Can't move in different planes
- Poor balance b/t flexor and extensor muscles
- May compensate for lack of stability by "fixing" in a position or even hyperextending
  - May pull shoulders back and extend jaw
- Will tire easily when using hands and begin to overcompensate by using other muscles to make movements

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## Stability, Mobility & Tone

- Child with hypertonicity has to make all movements against the resistance of the muscles
- Fix spine and limit movements to small ranges
- Movements may appear jerky
- Typical in children with cerebral palsy
- Increased spasticity

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## Understanding positioning

- Physical therapists and occupational therapists can provide valuable information
- Movement vs. position

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## Posture and positioning

- Postural activity
  - how the body works through the developmental process to learn to move against gravity
- Postural control
  - control posture without extraneous movement
- Postural alignment

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## Postural alignment

- Needed for feeding and swallowing
  - neutral head flexion (not a chin tuck)
  - neck elongation
  - stable depressed shoulder girdle
  - trunk elongation (balance: flexion/extension)
  - neutral base at pelvis (anterior tilt)
  - 90° hip flexion with feet on stable surface

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## Preparatory activities before positioning

- Alexander's postural activity is Sheppard's preparatory activity
  - prep the child before you position
  - work with the PT

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## Dynamic facilitation (Alper & Manno)

- Used with children who exhibit mild to severe motor impairment of oral and pharyngeal phases
- Goals are to:
  - normalize muscle tone
  - Improve biomechanical alignment of the body
  - Facilitate active functional activity
- After attaining optimal muscle tone and biomechanical alignment, child is engaged in functional activities (e.g. feeding) that use the muscles

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## Dynamic facilitation for Hypertonia

- Dissociating or flexing lower extremities
- Rotating the body
- Moving part or all of the body rapidly
- Using vibration
- Typical sequence:
  - Elongate or stretch muscles, inhibiting tone
  - Activate muscles by tapping or stroking

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## Dynamic facilitation for hypotonia

- Bouncing
- rotating the trunk
- weight bearing activities of the extremities and joints
- Practicing active movement tasks
- Providing static or intermittent compression on joints
- Rapid tapping or stroking of affected muscles

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## Dynamic facilitation for fluctuating tone (e.g. athetosis)+

- Intermittent compression of joints
- Weight-bearing activities
- Practicing movement patterns that involve use of graduated sequences of limited range movements
  - This sequential introduction helps children use more organized, slow, controlled movements

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## Dynamic facilitation for fluctuating tone (e.g. Ataxia)

- Joint compression
- Weight bearing
- Movements away from midline during rotational activities
  - May help child gain better control of more distal areas of the body

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## Options for positioning

- Seat child beside you
- Side lying position
- Prone position
- Seating device
- RELATIONSHIP OF HEAD & NECK, HIPS

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## Motor learning

- Sheppard (2008) Overview of learning approaches
- Optimum period of brain plasticity during first two years of life
  - Relatively easy for typically developing child to acquire motor skills needed for learning to eat

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## Relevant concepts in motor learning

- Children learn more easily if they feel comfortable with task and are attentive to related sensory input
- Typically developing children follow fairly predictable path, though there is variability
- Children learn better if the practice task is very similar to the target task (practice feeding with feeding)

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## Relevant concepts in motor learning

- Children improve in some tasks implicitly, so manipulate the natural task conditions with cues and reinforcements
- Rehearsal strategies can be helpful as practice but disrupt the functionality of the task
- Types of rehearsal strategies to consider...

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## Relevant concepts in motor learning – Rehearsal strategies

- Simulation – mimics the task (e.g. practice chewing on rubber toy rather than food)
- Fractionalization – parts of complex skills are practiced separately (e.g. breaking off piece of food and placing it on the molars)

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## Relevant concepts in motor learning – Rehearsal strategies

- Segmentation - practices one part of the task until functional and then adds the next step to be practiced together (e.g. putting the spoon to mouth and depositing food on tongue and then moving to placing the spoon in the mouth and having child use lips to clean spoon)
- Simplification – reduces difficulty of task (e.g. smaller bite)

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## Relevant concepts in motor learning

- Children learn better when given multiple opportunities to practice
- Random practice works better than blocked
  - Blocked – child performs same task over and over (e.g. spoon after spoon of applesauce)
  - Random – integrates related activities (e.g. spoon of applesauce, bite of cookie)

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## Relevant concepts in motor learning

- Better for children to have more frequent, shorter practice sessions
- Providing feedback about performance helps increase the likelihood they'll perform same action again
  - Use more frequent feedback when child is learning
- PRACTICE IN NATURAL ROUTINES

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## Neuromuscular impairments Clark 2003

- Weakness = reduced ability to produce force
  - Fatigue – weakness that becomes evident during sustained force production or over repeated trials
  - Difficult to assess in oral-pharyngeal systems
- Disrupted muscle tone = tendency of muscle tissue to resist passive stretch
  - Difficult to recognize in swallowing musculature

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## Neuromuscular impairments

- Effects of hypotonia may be difficult to distinguish from those of weakness

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## Types of neuromuscular treatment

Clark 2003

- Active exercises
- Passive exercises
- Physical Agent Modalities

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## Active exercise

- Goal is to improve strength and endurance
  - Need to understand the principles of exercise physiology
- Clark evaluated strength training programs (see her article)
- Keep in mind:
  - Effect of strength training in fatigue
  - Effect of increased muscle tone not indicated for children with spasticity or rigidity

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## Stretching

- Moving limb or articulator through full range of comfortable range of motion (ROM)
  - Active ROM
  - Passive ROM
- Stretching can increase tone or decrease tone, depending on speed of stretch

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## Stretching

- Quick stretch
- Stretch reflex is initiated and this increases tone
- Slow stretch
- Inhibits the stretch reflex and decreases tone
- When muscle tone is decreased, AROM and PROM may be increased

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## Stretching the oral muscles

- Using slow stretch in lip and tongue muscles not appropriate b/c they don't have the typical pattern of stretch reflexes
- Muscles that close the jaw have stretch reflex so may be appropriate to reduce tone

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## Stretching the oral muscles

- Stretching used more often to increase tone in lips and tongue as variation of strength training
- Would have best chance in jaw muscles to increase tone
  - No evidence to support use with lips

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## Massage as passive treatment

- Two types used:
  - Stroking – may help reduce spasticity
    - Jaw, lips, and superficial throat muscles externally
    - Tongue and velum – consider carefully if child hypersensitive
  - Tapotement
    - Tapping
    - Vibration

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## Massage

- Tapotement – Tapping
  - Tapping with fingertips over belly of muscle before or during contraction may stimulate the muscle spindle and increase the tone of the muscle (McCormack 1996)
    - Theoretically might work on jaw muscles
    - Lips do not have reflexive response to tapping (Barlow 1999)
      - Not clear how this would work over time

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## Massage

- Tapotement
  - Vibration targets sensory and motor systems
  - High frequency vibration evokes a tonic vibratory response (TVR)
  - Results from stimulating muscle spindle, leading to contraction of muscle targeted (and depression of antagonist through inhibition)
  - Vibration used to increase tone or the force of contraction of agonist or decrease tone of antagonist (Bishop, 1974)

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## Massage

- TVR absent in lip musculature
- TVRs observed in jaw musculature
- Clark suggest very careful consideration before using
  - Muscles overlap – hard to target exactly what you want
  - Don't use vibration in extrapyramidal or cerebellar lesions as it may exacerbate tremors and irregular muscle tone (McCormack 1996)

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## Oral sensorimotor treatment

- Inhibiting and Facilitating
  - Bahr 2001
  - Consider an example of a 'program' given Clark's caveats

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## Inhibiting response (Bahr)

- Used with hyper-responsiveness
- Designed to reduce strength of response or stop response
  - Slow, deep massage can inhibit muscle contraction or hypersensitive response to touch
  - Application of warmth

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## Facilitating response

- Used to strengthen desired response
  - Slow, deep massage can facilitate circulation and awareness in skin and muscles (heightening proprioception)
  - Quick stretches facilitate awareness in skin and muscles
  - Quick stretches can facilitate contraction
  - Rigorous gross-motor activity can facilitate overall muscle tone
  - Tapping, vibration, or friction can facilitate muscle tone

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## Oral massage (Bahr)

- 3-5 minutes
- Brings blood supply into muscle and connective tissue
- Sensation increased

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## Facilitation vs. compensation

- Facilitation (Treatment/exercise)
- Designed to improve function
- Example: Exercises to increase lip closure/strength
- Compensation
- Designed to compensate for impaired function
- Example: providing jaw support

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## Facilitation and compensation

- Some techniques may serve both purposes
- Tight breath hold while swallowing (super-supraglottic swallow) actually improves timing and closure (thus a facilitation)
- If used during meals, can protect airway during the swallow and compensate for decreased closure

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## In children....

- Overall tone and posture are so interrelated with function of oral mechanism that some compensations can actually facilitate better function
- Example: Positioning child prone to compensate for jaw clench associated with low tone will help the oral muscles function better and develop core muscles (for better trunk and shoulder control)

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## Compensations and facilitation

- Placing a child in a compensatory position to inhibit an abnormal response (e.g. jaw thrust) may facilitate a more appropriate response (e.g. graded jaw opening)

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## Specific oral structures and role in eating

- Jaw: Stable jaw essential for manipulating, forming and transporting bolus
- Lips: Lip closure keeps food in mouth
- Cheeks: Tone in cheeks assists with lip closure and keeps food from falling into lateral sulci and keeps food on surface of tongue
- Tongue: Tongue movements crucial for manipulating, maintaining and transporting bolus

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## Oral motor treatment

- Techniques to address specific oral motor problems
  - Evans Morris & Klein (2000)
  - Arvedson et al (2002)
  - Wolf and Glass (1992)
  - Bahr (2001)
- Look at what is causing the problem

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## Assessing tone in children

- Increased tone, or hypertonic
- Decreased tone, or hypotonic
- Fluctuating tone

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## Specific problems

- Description of the problem
- Activities to address the problem

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## Caveat on 'abnormal'

- Some abnormal postures, positions or movements are actually the child's attempt to stabilize and gain some control as they compensate for impaired function
  - Example: child with low tone may clench jaw shut b/c she has poor tone in muscles that open and close mouth ... all or nothing

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## Problems associated with increased tone

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## Jaw thrust

- Sudden and forceful opening of the jaw
  - poor sitting position with too much hip extension and posterior pelvic tilt (increases body tension)
  - over-stimulating environment
  - TMJ dislocation
  - hypersensitivity in mouth
- CN V & VII
- Digastric (anterior belly)
- Mylohyoid
- Masseter
- Geniohyoid
- Lateral and medial pterygoid
- temporalis

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## Problems typically associated with increased tone

- Jaw thrust
  - Sitting posture\*
  - Examine sensory input
- Jaw Thrust
  - Position prone\*
- Jaw Thrust
  - Reduce hypersensitivity to contact with teeth through firm pressure\*
- Jaw Thrust
  - Increase sensory input to tongue (toys, tooth brushing)\*
- Jaw Thrust
  - Activities to maintain jaw closure\*

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## Jaw retraction

- Pulling back of the mandible
  - poor sitting position with too much hip extension and posterior pelvic tilt (increases body tension)
  - over-stimulating environment
- CN V & VII
- Digastric (anterior belly)
- Mylohyoid
- Masseter
- Geniohyoid
- Lateral and medial pterygoid
- temporalis

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## Problems associated with increased tone

- Jaw retraction
  - Sitting posture
  - Examine sensory input
  - Position prone
- See same interventions as on jaw thrust

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## Lip retraction

- Lips pulling back in a tight horizontal line
- Interferes with sucking from bottle, removing food from spoon or cup, and keeping food in mouth during chewing
  - poor sitting position with too much hip extension
  - over-stimulating environment
- CN VII
- Orbicularis Oris
- Buccinator

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## Problems associated with increased tone

- Lip Retraction
  - Sitting posture
  - Examine sensory input
- Lip Retraction
  - Facial molding
- Lip Retraction
  - Vibrations to face and cheeks
    - index and middle finger\*
    - from nose down through upper lip\*

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## Problems associated with decreased tone

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## Jaw clench

- Tight squeezing of the teeth, or even teeth grinding
  - poor sitting position (too much hip flexion & posterior tilt of pelvis) increases body flexion
  - low tone in trunk and postural instability
  - child reacts to low tone by clenching jaw
  - over-stimulating environment
  - hypersensitivity in mouth
  - avoidance (keep things out of mouth)
- CN V & VII
- Digastric (anterior belly)
- Mylohyoid
- Masseter
- Geniohyoid
- Lateral pterygoid
- Temporalis

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## Problems associated with decreased tone

- Jaw clench
  - Better sitting posture
  - Position child prone
  - Reduce hypersensitivity to contact with teeth
  - Increase sensory input to tongue through mouthing of toys & tooth brushing

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## Jaw instability

- Jaw shifting from side to side or forward
  - hypotonic face and trunk
  - disorder of TMJ
- CN V & VII
- Digastric (anterior belly)
- Mylohyoid
- Masseter
- Geniohyoid
- Lateral pterygoid
- Temporalis

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## Problems associated with decreased tone

- Jaw instability
  - Playful activities to maintain jaw closure
- Jaw Instability
  - Provide jaw assist\*\*\*
- Jaw instability
  - Tactile and proprioceptive stimulation to jaw muscles\*
- Jaw Instability
  - Increase tone in the trunk\*
- Jaw Instability
  - Quick stretch
    - over masseter\*
    - over buccinator\*

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## Bunchy tongue

- Thick, humped tongue which can interfere with sucking and forming a bolus
  - low tone in mouth
  - decreased sensation in mouth
  - damage to CN XII (decreased movement)
  - damage to CN VII (decreased sensation)
- CN VII & XII
- Hyoglossus
- Styloglossus
- Genioglossus
- Vertical
- Transverse
- Inferior and superior longitudinal
- *Note: Children with Down Syndrome may seem to have a "large" tongue, when actually it is low tone and small jaw (Bahr, 2001)*

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## Problems associated with decreased tone

- Bunchy tongue
  - Increase sensory input through tooth brushing
  - Increase tone in the trunk
  - Sensory input through vibrations to tongue\*
- Bunchy Tongue
  - Increase tongue stability for more forward placement of the tongue
    - chin tuck position\*
    - tapping under chin\*

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## Low tone in the cheeks

- Hypotonia
- Interferes with efficient sucking, bolus formation and bolus maintenance
  - low tone in rest of body
  - decreased sensation in face and mouth
  - damage to CN VII (facial weakness)
  - damage to CNV (decreased sensation)
- CN V & VII
- Buccinator

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## Problems associated with decreased tone

- Decreased tone in the cheeks
  - Increase postural tone in the trunk
  - Tactile and proprioceptive stimulation of jaw muscles
  - Straw drinking\*
  - Quick stretch of masseter and buccinator

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## Low tone in lips

- May result in drooling or loss of liquids
- Low tone in rest of body
- CN VII
- Orbicularis Oris

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## Low tone in lips

- Increase postural control in trunk
- Straw drinking
- Tapping and stroking

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## Problems not unique to increased or decreased tone

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## Tonic bite reflex

- Mandible clenches on an object
  - poor sitting position with too much hip flexion or extension with posterior pelvic tilt(leads to increased body flexion and tension)
  - overstimulating environment
  - oral hypersensitivity
- CN V & XIII
- Digastric
- Mylohyoid
- Geniohyoid
- Temporalis
- Masseter
- Medial pterygoid
- Temporalis

• *Note: this is NOT purposefully clenching teeth*

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## Problems not unique to increased or decreased tone

- Tonic bite reflex
  - better sitting posture
  - reduce hypersensitivity to contact with teeth
    - firm pressure to face, gums, teeth
    - assist jaw closure
  - Increase sensory input to tongue
    - fingers and toys
    - toothbrushing

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## Tongue thrust

- Forceful protrusion of the tongue out of the mouth
  - compensation for low tone
  - hyperextension of neck with shoulders retracted causes increase in extensor patterns
  - compensation for difficulty breathing
  - delayed development of tongue lateralization, so child uses thrust to manipulate food
- CN XII
- Hyoglossus
- Genioglossus
- Transverse
- Inferior and superior longitudinal

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## Problems associated with decreased tone

- Tongue thrust
  - Better sitting posture
  - Increase postural tone in the trunk
  - Provide jaw assist
  - Move child to more textured foods
  - Create tongue bowl\*
    - spoon on tongue
    - vibration

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## Oral hypersensitivity

- Reaction to stimuli that is much stronger than expected
  - low threshold to stimulation secondary to neurological damage
  - increased postural tone
  - overall lack of stimulation that normally occurs during feeding in children who are tube fed
  - hypersensitive gag
- CN V, IX & X

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## Problems not unique...

- Oral hypersensitivity
  - Reduce hypersensitivity to contact with teeth through pressure on face
  - Increase sensory input to tongue
  - Desensitize tongue/gag\* (see next topic)
- Oral hypersensitivity
  - Vibrations to tongue and oral cavity
    - electric toothbrush \*
- Oral hypersensitivity
  - Grading stimuli\*

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## Oral Hyposensitivity

- Decreased response to sensory input
- Reduced sensitivity to stimuli secondary to neurological damage
- Sensory integrative dysfunction
- CN V, IX & X

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## Oral hyposensitivity

- Increase sensory input to tongue through variety of tools
- Vibrations on face and cheeks
- Move to more textured foods
- Vibrations to tongue and oral cavity
- Increase sensory input to upper lip

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## Hyperactive gag

- Exaggerated response to stimulation in mouth
  - lowered threshold to stimuli secondary to neurological damage
  - decreased experience with stimuli in the mouth related to tube feeding
- CN IX

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## Problems not unique to...

- Hyperactive gag
  - reduce hypersensitivity to contact with teeth
  - increase sensory input to tongue
  - vibrations to tongue and oral cavity
  - desensitize tongue \*

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## Tongue retraction

- Tongue pulling back into the oral cavity
  - low tone that creates exaggerated extensor movements
  - high tone that creates exaggerated movements
  - neck hyperextension and shoulder retraction
- CN XII
- Vertical
- Transverse
- Inferior and superior longitudinal
- Genioglossus

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## Notes on tongue retraction

- Children with Pierre Robin and micrognathia may have tongue retracted into airway
- Children with cleft of hard palate may pull tongue back to fill opening
- Tongue retraction may be confused with tongue thrust. Food may be pushed out of mouth in either
  - In tongue retraction, tongue is retracted at rest
    - Arvedson et al 2002 pp. 389-468

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## Problems not unique...

- Tongue retraction
  - position prone
  - increase postural tone in the trunk
  - increase tongue stability for more forward movement
    - chin tuck
    - tapping under chin on base of tongue
  - vibration to center of tongue to flatten it

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## Limited tongue movement

- Limited tongue movement observed in eating, mouthing toys
  - high tone which causes tongue to be stiff
  - low tone which causes the tongue to be floppy
  - flaccid tongue secondary to CN XII damage
- CN XII
- Vertical
- Transverse
- Inferior and superior longitudinal
- Hyoglossus
- Styloglossus
- genioglossus

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## Problems not unique....

- Limited tongue movement
  - increase sensory input to tongue
  - increase postural tone in trunk
  - Compression on jaw at insertion of masseter (several minutes)
  - vibrations to tongue and in oral cavity
  - increase tongue stability for more forward movement
  - vibration of center of tongue to flatten

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## Limited upper lip movement

- Limited movement seen in eating, mouthing toys
  - high tone which causes lips and cheeks to be stiff
  - low tone which causes lips and cheeks to be floppy
  - facial weakness secondary to CN VII damage
  - reduced sensation secondary to CN V damage
- CN V & VII
- Orbicularis oris
- Buccinator

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## Problems not unique

- Limited upper lip movement
  - vibrations on face and cheeks
  - increase postural tone in the trunk
  - tactile and proprioceptive stimulation of jaw muscles
  - vibrations to upper lip from vibratory source
  - quick stretch to lip\*
- Limited upper lip movement
  - increase sensory input to lips \*
  - increase control through straw drinking

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## Tips to develop more mature feeding patterns

- SPOON
  - initial trials resemble sucking food from spoon
  - begin with smooth, runny pureed textures
  - introduce only one change at a time
    - runny peaches
    - runny pears
    - textured pears

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## Spoon feeding

- Place spoon on midline
- Give downward pressure to encourage lip closure
- Give external jaw and lip support as needed \*
- Stimulate upper lip as needed

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## Spoon feeding

- Put only small amount of food on front of spoon so you can control where it goes
- To avoid tongue thrust pushing food out, provide assist for jaw and lip closure

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## Spoon feeding

- Foods of mixed consistencies may be very difficult
  - cereal with milk
  - fruit cocktail
  - green beans
  - peas
  - stewed tomatoes

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## Transitional feeding cup

- 6-8 months
    - tongue protrusion
  - 7-8 months
    - 1-2 swallows
    - chokes easily
  - 9-10 months
    - drinks from cup held
  - 12 months
    - holds with 2 hands
- Related motor development
    - able to bring head forward
    - head movements supported by trunk control
    - ability to sit without support

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## Cups

- Should allow drinking without tipping head back
- Clear solo cups
- Nosey cups
- Mag-Mag Training Cup System

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## Tips for more mature patterns

- CUP
  - Careful positioning of head
  - Place cup on the child's lower lip, not the teeth or gums
  - Provide jaw support
  - Tilt only far enough to let liquid touch upper lip

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## Cup drinking

- Coordinated jaw stabilization may not be seen until 2 years of age
- Flow of liquid into the mouth may startle the child
  - try thicker liquids
  - for older toddlers, use age appropriate thick drinks like fruit smoothies

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## Transitional feeding-bite & chew

- 6 months
    - munching pattern
  - 7-12 months
    - rotary chew
  - 8 months
    - lateral movement of tongue
  - 10 months
    - definite chewing
- Related motor development
    - spurt in gross motor
    - ability to move tongue laterally
    - ability to maintain bolus over molars
    - improving fine motor control

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## Tips for more mature patterns

- CHEWING
  - Place food on lateral chewing surfaces \*
  - Use foods that are easily softened with saliva (e.g. cookie, cracker)
  - Avoid foods that fall apart (e.g. pretzels) or don't dissolve well (e.g. bread)
  - Alternate sides for presenting

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## Lateralization needed for chewing

- Practice with pureed food placed on molar surfaces
- Child “sweeps” out with tongue before swallowing
- Can practice munching on NUK® brushes or Theratubing™
- Gummy-type candy wrapped in cheesecloth to provide flavor
- Dry cereal (e.g. Cheerios®) placed on midline of tongue and child asked to move to one side, back to middle, over to other side

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## Chewing - tongue lateralization

- Try foods with long, thin shape the feeder can hold
  - French fries, cheese, potato
- Place pieces at midline of tongue for child to move laterally to chewing surfaces

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## Tips for more mature patterns

- BITING \*
  - Don't introduce until child can move food from midline to lateral chewing surface
    - You can assist moving it to the side
  - Simulate by pulling slightly on food placed between lateral chewing surfaces, or scraping on top teeth

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## Tips for more mature patterns

- STRAW DRINKING
  - Great variability ( 1 - 3 years of age)
  - Initially child may position straw toward back of mouth and curl tongue around straw
  - Don't introduce until coordinated with cup drinking
  - Try short straws
  - Thick walled tube in squeeze bottle
  - Dipping straw

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