Feeding Evaluation and Intervention of Preterm Infants

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Feeding problem

• During the last **20 years**, interest in and knowledge about swallowing disorder has **increased tremendously**
• Feeding and swallowing disorders in **children** have been **recognized independently** from dysphagia in the **adult** population
• Feeding problem during childhood occurs in a context of neurological maturation, increasing nutritional needs, rapid physical growth, and **cognitive and psychosocial development**
Feeding process in infant ...

1st
- Postural stability

2nd
- Response to tactile input .. oral reflex

3rd
- Latch on

4th
- Sucking

5th
- Swallowing

6th
- Integration sucking-swallowing-breathing
1st Postural stability

- The tongue fills the oral cavity and is solely located in the oral cavity.
- And the sucking pads is located in the masseter muscle .... small intraoral space.
- The mandible is relatively smaller.
- Larynx high in the neck.

Adequate stability for oral movement in newborns who have not yet developed postural stability.

Stability of the head, neck and shoulder is required for adequate oral-motor function.
1st Postural stability

Positioning
• Infants normal posture is a natural, flexed position
• Respiratory mechanism
• Oral motor and swallowing control
• Psychological emotional stability (security)
• Inhibition of abnormal movement patterns and reflexes

PRONE
SUPINE
SIDELYING
2nd Rooting-Sucking Reflex

- The mouth is the infants **oral sensorium** and first **handle on the world**
- The ability to **accept touch** to the **cheeks, lips, gums, and tongue** is therefore a **prerequisite** for feeding
- Normal infant **get pleasure** from **oral tactile experiences**
- The **early mechanism** to find breast
- This response **prepare** the baby to **start to suck breast milk**
3rd Latch On

- Maternal **posture** and **position** of infant
- Beginning position of **nose aligned** to nipple and head tilt
- **Movement** of the infant onto the breast
- Nose and chin position
- **Latch-On**
4th ... Sucking

- Lip seal around the nipple
- The oral cavity completely closed
- Adequately compress the nipple
- Squeeze liquid out
- Tongue and mandible drop
- Liquid is sucked

Positive Pressure

Negative Pressure
## Characteristics of Sucking

<table>
<thead>
<tr>
<th></th>
<th>Nutritive Sucking</th>
<th>Non-Nutritive Sucking</th>
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<tbody>
<tr>
<td><strong>Purpose</strong></td>
<td>Obtain <strong>nourishment</strong></td>
<td>State <strong>regulation</strong>, satisfy sucking desire, exploration</td>
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<tr>
<td><strong>Rhythm</strong></td>
<td>Initial continuous sucking burst, moving to intermittent sucking bursts with bursts becoming shorter and pauses longer over the course of feeding</td>
<td>Repetitive pattern of bursts and pauses; stable number of sucks per burst and duration of pauses</td>
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<tr>
<td><strong>Rate</strong></td>
<td><strong>One suck per second</strong>, constant over course of feeding</td>
<td><strong>Two sucks per second</strong></td>
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<td><strong>Suck: Swallow Ratio</strong></td>
<td>Young infant-1:1, may be higher at the end of feed Older infant-2 or 3:1</td>
<td>Very high ratio, 6:1 or 8:1</td>
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Swallowing

• The closure of the nasal and oral openings
• The larynx elevates and the vocal folds contract to provide airway protection
• The opening of cricopharyngeal sphincter
• Creation of sufficient pharyngeal pressure gradient to transport the bolus
Premature infant

- Facial and oral musculature... reduced in bulk
- Stabilizing tendinous and ligamentous structure... poorly developed
- Diminished **facial fat and sucking pads**
- Lacks **postural control**
- The **mouth tend to be open**
- Poor respiratory control... Lack of **oral experience**

- Reduced **coordination of sucking, swallowing and breathing**
- Reduced **endurance**
- Reduced **strength and control** of oral structures
- **Modulation** problems
- Reduced **oral-motor control** or **oral hypersensitivity**
Clinical feeding evaluation ...

- **History** (current status, social history, medical history, feeding and swallowing history)
- Behavior/state/sensory integration
- General postural control
- Respiratory function and endurance
- Oromotor evaluation
- Feeding evaluation
The NOMAS contains checklists of behaviors in categories of normal, disorganized, and dysfunctional sucking on the basis of tongue and jaw movement.

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<tr>
<th>Normal</th>
<th>Disorganization</th>
<th>Dysfunction</th>
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<td><strong>Jaw</strong></td>
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- Consistent degree of jaw depression
- Rhythmical excursions
- Spontaneous jaw excursions occur upon tactile presentation of the nipple up to 30 minutes prior to a feed
- Jaw movement occurs at the rate of approximately one per second (½ the rate of NNS)
- Sufficient closure on the nipple during the expression phase to express fluid from the nipple
| **Jaw** |
- Inconsistent degree of jaw depression
- Arhythmic jaw movements
- Difficulty initiating movements:
  - inability to latch on
  - small, tremor-like start-up movements noted
  - does not respond to initial cue of nipple until jiggled
  - Persistence of immature suck pattern beyond appropriate age:
    - under 40 weeks PC (transitional suck)
| **Jaw** |
- Excessively wide excursions that interrupt the intra-oral seal on the nipple
- Minimal excursions, clenching
- Asymmetry; lateral jaw deviation
- Absence of movement (% of time)
- Lack of rate change between NNS and NS (NNS = 2/s; NS = 1/s)
| **Tongue** |
- Cupped tongue configuration (tongue groove) maintained during sucking
- Extension-elevation-retraction movements occur in anterior-posterior direction
- Rhythmical movements
- Movements occur at the rate of one per second
- Liquid is sucked efficiently into the oro-pharynx for swallow
| **Tongue** |
- Excessive protrusion beyond labial border during extension phase of sucking without interrupting sucking rhythm
- Arhythmic movements
- Unable to sustain sucking pattern for two minutes due to:
  - habituation
  - poor respiration
  - fatigue
  - Incoordination of suck/swallow and respiration which results in nasal flaring, head turning, extraneous movement
| **Tongue** |
- Flaccid; flattened with absent tongue groove
- Retracted; humped and pulled back into oro-pharynx
- Asymmetry; lateral tongue deviation
- Excessive protrusion beyond labial border before/after nipple insertion with out/down movement
- Absence of movement (% of time)

Palmer et al. (1993). Published with the permission of M. Meyer Palmer.
Instrumental techniques to assess deglutition in infants and young children

- Fiberoptic Endoscopic Evaluation of Swallowing (FEES)
- Ultrasonography

Ciptomangunkusumo Hospital
When are premature infants ready to feed?

- **Medically stable**
- **Postural control** has improved and the infant can **bring hands** to his or her **face** and **mouth**
- **Cardiopulmonary stability**
- **Appropriate state** before feeding (calm, pink, alert, organized)
- The infant demonstrates a **rhythmic non-nutritive sucking**
- Premature infants **start feeding** (bottle or breast) around **34-35 weeks**
Take home message ......

- If an infant can produce **non-nutritive sucking (NNS)** she or he **may or may not** demonstrate a normal nutritive sucking (**NS**) 

- Conversely, if an infant **does not** demonstrate a normal NNS, she or he **will not exhibit** a normal **NS** and is **not yet ready** for oral feedings
What can we do?

1. Establish the optimal infant state: alerting/calming cues; **swaddle the infant**
2. Use **oral stimulation** to help increase sucking
3. Establish/promote **non-nutritive sucking** prior to oral feeding. Encourage **pacifiers** during tube feedings.
4. Utilize a behavioral management program: reinforce **pleasurable experiences**
5. **Alter the environment**
6. **Reduce oral aversion** to feeding
7. Watch for **signs of infant stress**
Swaddle with optimal midline control
Swaddle with optimal midline control
Beckmann Oral Stimulation
Therapy for Low Buccal Tone
Take home message ....

• The management of pediatric dysphagia requires a thorough knowledge of infant anatomy, physiology and the maturational changes that occur normally.

• Feeding begins at birth and has an enormous impact on the child’s development, health, growth and later social skills and independence.