Cue Based Feeding in the NICU

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Objectives:

- Understand what cue-based feeding is
- Provide overview to protocols/research on cue-based feeding
- Be able to recognize readiness cues and signs of disengagement as well as when to end a bottle feed based upon cues
- Ideas for implementing cue-based feeding in your setting
Different approaches to oral feeding

- **Scheduled**: q3, PO q/day, BID, TID
  - This is the more traditional approach to feeding
  - May also hear it referred to as staff-led feeding

- **Cue Based**: offering oral feeding based on infant readiness
  - May also hear it referred to as infant-driven or infant-led feeding

- **On Demand/ Ad Lib**: feed when awake with cues no specified time or volume
What is cue-based feeding?
What is cue-based feeding?

• A culture that is **infant-driven** vs. **volume-driven**:
  
  • The aim of an infant-driven approach is to help infants learn to feed, not to get them to eat or ‘get it all in.’ Safety becomes the primary goal (Ludwig & Waitzman, 2007).

  • Nipple feedings initiated in response to the infant’s behavioral cues and ends when the infant demonstrates satiation (Tosh & McGuire, 2007).

• Includes both breast and bottle feeding
What is cue-based feeding?

- Oral feeding initiation in preterm infants needs to take into account infant’s physiologic maturity levels, skills, and capabilities

- Protocols have been initiated in NICUs and are the gold standard; however, are widely misused

- Completing all feeds orally is comparable to running a marathon to a preterm infant: infants need time to “train” to complete all feeds like any person/adult would train for a marathon

- Individualized based on infants continuous feedback
What is cue-based feeding?

<table>
<thead>
<tr>
<th>What <strong>IT IS:</strong></th>
<th>What <strong>IT’S NOT:</strong></th>
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<tbody>
<tr>
<td>• Infant driven</td>
<td>• Volume driven</td>
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<tr>
<td>• Quality</td>
<td>• Quantity</td>
</tr>
<tr>
<td>• Modified (flexible) schedule</td>
<td>• Scheduled feeds</td>
</tr>
<tr>
<td>• Safe oral intake/based on cues</td>
<td>• A prescribed volume per feed</td>
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<tr>
<td>• Following the baby’s lead</td>
<td>• Making the baby eat/finish the bottle</td>
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<tr>
<td>• About the infant’s feeding skills (relationship)</td>
<td>• About the caregiver’s feeding skills (task oriented)</td>
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Benefits for family/caregiver

- Interaction during feeding provides the opportunity for the caregivers to learn their infant’s cues.
- The ability to respond to the infant’s needs increases attachment and confidence.
- Gives the caregiver ownership of something they can do for their baby in an ever changing environment.
Benefits for nurses

- Eliminates pressure to complete volume
- Eliminates pressure of feeding a disengaged infant
- Supports infant neurodevelopment of the child
- Application of evidenced-based practices
- Opportunity to educate parents about behavior responses
- Consistency across all caregivers
- Sensitive to infant-led feeding
Promoting caregiver sensitivity

- Recognizing and attending to the infant’s cues to determine when to apply external feeding strategies
- Knowing when to allow the infant to regulate his own feeding behaviors
- Proactively promoting safety awareness throughout feeding
- Intervening based on infant cues to support self-regulation

Thoyre, 2003; Shaker, 1999
Synactive Theory

MODEL OF THE SYNACTIVE ORGANIZATION OF BEHAVIORAL DEVELOPMENT

Systems:
- Attentional/Interactive
- State
- Motor
- Autonomic

ENVIRONMENT
- World at Large
- Parental Extraterrestrial Environment
- Isolite

ORGANISM
- Week
- Behavior
- 47-52: Object Play
- 42-46: Social Reciprocation
- 37-41: Focused Alertness
- 32-36: Rapid Eye Movement
- 28-31: Complex Movements
- 25-27: Facial Respiratory Movement
- 21-24: Rapid Eye Movements
- 17-20: Coordinated Hand-to-Face Movements
- 13-16: Eye Opening and Eye Movements
- 9-12: Isolated Head and Limb Movements
- 2-8: Flexor Posture
- Conception
- 4: Twitching Movement
Different cue-based tools

- Early Feeding Skills Assessment (EFS)
- Preterm Infant Breastfeeding Behavior Scale (PIBBS)
- Supporting Oral Feeding in Fragile Infants (SOFFI)
- Infant Driven Feeding Scale (IDFS)
Early Feeding Skills (EFS)

- From infants perspective and to teach adult to “read the feed”
- Can be administer by anyone with the goal to each parents
- Check list
  - Readiness
    - Motor
    - Behavioral State
    - Oral Motor behavior during non nutritive suck

- Early feeding skills assessment
  - Respiratory
  - Engagement
  - Oral-motor function
  - Swallowing Coordination
  - Physiological stability
- Recovery
  - Behavioral State
  - Energy Level
- Two day training required to use tool
Preterm Infant Breastfeeding Behavior Scale (PIBBS)

- Used to assess development of sucking behavior during breastfeeding
- Scale allows for observer and maternal input.
- Evaluates rooting, latch, sucking, swallowing, infant state, and let down reflex.
Supporting Oral Feeding in Fragile Infants (SOFFI)

- Used for preterm and fragile infants
- Based on the Synactive Theory
- Algorithm with sequence of assessments, questions and decisions that lead to actions taken.
- Focus on readiness scoring prior to feeding and quality scoring during feeding
- Includes both breastfeeding and bottle feeding
- Two day training course
Infant Driven Feeding Scale (IDFS)

- Similar to SOFFI principles
- Ranks readiness and quality of the feed
- Each item will have a 5 point scale (1= most optimal and 5= least optimal)
- Quality:
  - Coordination
  - Consistency
  - Rhythm
  - Strength of suck, swallow, breath
- Readiness:
  - Engagement and disengagement
Early feeding development

- Taste buds develop at 7-8 weeks
- Suckle movements begin at 9-10 weeks
- Babies will begin to swallow amniotic fluid in the early 2nd trimester
- Lick & suck hands/thumb as early as 18 weeks
- True sucking begins around the 18th and 24th week in utero
- In the last trimester, the fetus swallows up to 23-25 ounces of amniotic fluid per day
Suck/swallow/breathe development

- Remember, infants have had a lot of practice sucking and swallowing in utero, starting around 12-13 weeks.

- At 32-33 weeks, sucking begins to become more rhythmical.

- At 34 weeks, a true suck/swallow is developed (which is why this is typically a better time to consider starting oral feeds).

- To be an efficient with oral intake, the baby needs to coordinate suck, swallow, AND breathing; this comes closer to 40 weeks (longer for very preterm or medically complex infants).
Suck/swallow/breathe development

- That's a 6 week period where they may not be prepared to do what we’re asking and will require support.

12-13 weeks: suck/swallow in utero

32-33 weeks: Begin to see increased sucking rhythm

40 weeks: Coordinated s/s/b

34 weeks: True suck/swallow

**Period that infant may need increased support to accomplish task of feeding.**
Suck/swallow/breathe development

- Preterm infants will not present with a mature s/s/b pattern.
- More often, they present with an immature pattern.
- Sometimes, a non-rhythmical, unpredictable pattern is observed. This is considered disorganized.
  - With these babies, it’s hard to know what’s coming next and how to respond to the babies cues
  - You can probably imagine the infant with the pattern that’s all over the place
    - *Suck, suck, breathe, suck, breathe, breathe, suck, suck, suck,* suck...
Readiness cues

- Awakens spontaneously at the scheduled feeding times
- Demonstrates hunger cues prior to/during care times
- Rooting and/or hands to mouth and midline, seeking suckle on pacifier and hands for at least 2-5 minutes
- Good muscle tone and maintaining alertness
- Maintains all of the above when transitioned to caregivers’ lap in preparation to initiating feeding
Feeding readiness: full-term infant

Attributes for feeding success:

- Physiologic stability
- Good flexor tone
- Oral structures are effective for eating
- Demonstrate coordinated suck/swallow/breathe pattern
- Term brain development
Feeding readiness: preterm infant

Challenges to feeding success:

- Physiological instability
- Poor endurance
- Decreased flexor tone throughout
- Oral structures are small, weak, uncoordinated
- Immature:
  - suck/swallow/breathe pattern
  - brain development
What stress cues do you typically look for while feeding a preterm infant?
### Infant stress/disengagement cues:

<table>
<thead>
<tr>
<th><strong>STATE &amp; ATTENTIONAL</strong></th>
<th><strong>MOTOR</strong></th>
<th><strong>AUTONOMIC</strong></th>
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<tbody>
<tr>
<td>Gaze aversion</td>
<td>Sitting on air</td>
<td><strong>Moderate Stress:</strong></td>
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<tr>
<td>Glassy eyes</td>
<td>Saluting</td>
<td>Yawning</td>
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<tr>
<td>Irritability</td>
<td>Grimacing</td>
<td>Hiccuping</td>
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<tr>
<td>Poor level of alertness</td>
<td>Finger splaying</td>
<td>Gagging</td>
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<tr>
<td>Diffuse sleep states</td>
<td>Squirming</td>
<td>Sneezing</td>
</tr>
<tr>
<td>Raised eye brows</td>
<td>Arching of trunk</td>
<td>Color change</td>
</tr>
<tr>
<td>Furrowed brow</td>
<td>Tongue thrusting</td>
<td>Stooling</td>
</tr>
<tr>
<td>Drowsy</td>
<td>Decreased muscle tone</td>
<td><strong>Major Stress</strong> (when related to feeding):</td>
</tr>
<tr>
<td>Inconsolability</td>
<td>-hypo or hypertonicity</td>
<td>Spitting up</td>
</tr>
<tr>
<td></td>
<td>Pulling away</td>
<td>Gagging/choking</td>
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<tr>
<td></td>
<td>Turning head</td>
<td>Color changes</td>
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<td></td>
<td>Open mouth at rest</td>
<td>Respiratory pauses</td>
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<tr>
<td></td>
<td></td>
<td>Irregular respiration</td>
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</table>
Stress/disengagement cues
Why are cues important?

Early feeding experiences impact later feeding skills and behaviors:

- 55% of preterm infants have feeding problems by 6-18 months of age
- Although less than 1% of preterm infants required tube feedings at discharge, over 50% of parents reported problematic feeding behaviors at 18 & 24 months
- Parents of NICU graduates reported disorganized feeding (coughing, feeding refusal, vomiting) in 39% of infants at 6 months and 37% at 12 months
- Parents of children with feeding problems report increased stress, anxiety, and diminished family functioning

Kirby et al, 2007; Dusick et al, 2003; Hawdon, 2000; Samara et al, 2009; Thoyre, 2007
Long term outcomes...

• Early experiences affect brain development and influence long term feeding behaviors

• Feeding can be **FUN** if infant cues are observed and respected

• You can make a difference!
Effects of stress on neonatal brain developmental

https://www.albertafamilywellness.org/resources/video/brains-journey-to-resilience
Effects of toxic stress

**POSITIVE**
Brief increases in heart rate, mild elevations in stress hormone levels.

**TOLERABLE**
Serious, temporary stress responses, buffered by supportive relationships.

**TOXIC**
Prolonged activation of stress response systems in the absence of protective relationships.

Resource: Center for the Developing Child, Harvard University
Videos of feeding in the NICU

- https://youtu.be/D49D2z2fGAM
- https://www.youtube.com/watch?v=6E66ErDjt_o
- https://youtu.be/nJLASs_pafo
- https://youtu.be/qFKIP67lWDM
- https://youtu.be/8sxEYZifV0M
How to implement cue-based strategies:

- Remember how we feed our babies in infancy translates to how well/poor they will feed in the future, you are the difference!

- Unified language, understanding the jargon:
  - Follow-up with tools provided today
  - Shaker for Swallowing and Feeding (website)

- Stay current with research and steer away from quantity-driven feeding practices

- Honor infants’ stress cues, allow infant to speak to you during a feeding with their cues

- Providing appropriate compensatory strategies and know when to fade compensatory strategies
  - Knowing the benefit of a slower flow rate nipple, and the appropriate signs/maturity of when to transition to faster flow nipple (assistance from feeding therapist when needed)
How to implement cue-based strategies:

- Buy-in and support from nursing administration, medical director, educators and staff,
  - Without this, it is not sustainable
- Research based, ease of use and comprehensive education
  - Global understanding of the protocol
- Annual re-checks/education as well as champions to preserve protocol integrity
  - Update and implement protocol changes
References:


- Tosh K, McGuire W. Ad libitum or demand/semi-demand feeding vs scheduled interval feeding for preterm infants. The Cochrane Database of Systematic Reviews 2006; April 7(2) CD005255


References:

- Kirby et al, 2007;
- Dusick et al, 2003;
- Ross ES. Feeding in the NICU and issues that influence success. Perspect Swallowing Swallowing Disord. 2008;17:94-100
- Samara et al, 2009;