Safe, Positive Feeding & Developmental Care: Feeding Based on Infant Cues

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Objectives

- Identify readiness signs for nipple feeding in the premature infant
- Identify feeding techniques that will assist the premature infant in achieving a successful transition to oral feeding
- Identify common feeding questions and answers
The Importance of Feeding & Developmental Care

- Feeding problems develop through interactions among biological, behavioral, and environmental factors, and preterm infants and their families, especially infants born extremely preterm, are at high risk for feeding problems, developmental delay, and relationship difficulties as well as compromised growth. (Browne, Ross, 2011)
Why is feeding so important?

- Feeding is the first conversation between parent and child
- Increased survival rates of medically fragile, extremely premature infants
- Increase in feeding disorders in medically complex/developmentally delayed percentages: Much higher -- 33-80%
NICU Population

- Preterm/Feeder Grower (physiologic stability)
  - Very Low Birth Weight (VLBW): Birth weight <1,500 g
  - Extremely Low Birth Weight (ELBW): Birth weight <1,000 g
- Medically Complex Term Infant (s/p surgeries, structural anomalies, congenital anomalies, etc.)
Common etiologies which may lead to problematic feeding

- Prematurity
- Birth trauma
- Low APGARs
- IVH
- Congenital Heart Disease
- IDDM
- Respiratory disorders
  - BPD
  - CLD
  - Other respiratory disorders
- Tracheomalacia
- Laryngomalacia
- TE Fistula (even after repair)
- Vocal Fold Dysfunction

- Gastrointestinal Disorders
  - (Omphalocele, short gut, irritable bowel syndrome, GER, Esophagitis, NEC, perforated bowel)
- Gastrostomy, history of tube feeding
- Cleft lip and/or palate
- Cystic Fibrosis
- Chromosomal anomalies
  - Down Syndrome
  - Di George
  - Other chromosomal anomalies
- Metabolic Disorders
- Maternal drug use, infant drug withdrawal
- Certain Medications (AZT, caffeine, etc.)
The importance of developmental care for ELBW & VLBW infants

- Long-term outcome: VLBW and ELBW infants are at ↑ risk for cerebral palsy, developmental delay, mental retardation, visual problems (including blindness), hearing impairment, chronic lung disease and SIDS. Risk for these ↑ with decreasing BW and GA.
Parenting Relationship to Feeding Begins Early

- “For parents of preterm infants, the usual evolution of parenting has been disrupted, and parents are in many ways as premature as their infant.” Lawhon, Gretchen (2002).
- Parents limited experience with premature infants may negatively impact their interactions with their infant and their ability to care for them.
- Start by building the caregiver/infant relationship to support more successful, positive feeding experiences.
- Encourage Skin to Skin holding following oral feeding. Skin to Skin holding fosters interaction & attachment and may also improve infant’s overall feeding experience.

- Feeding should be a positive experience for babies and their parents
Our goal: Safe, Positive Feeding Experiences for Infants and Caregivers

“The combinations of physiologic instability during feeding and a sensory–motor system that is undergoing rapid development in an unpredictable and often overwhelming environment may be a potential risk factor [for adverse feeding outcomes].” Shaker, 2012.
Signs of Readiness

- Stable Vital Signs
  - Respiration rate less than 60–70 at rest
  - No lung retractions
  - HR/O2 sats WNL
- Tolerating daily care routines (position changes, diaper change, bath, assessment checks)

- Good tolerance of bolus feeding
  - No significant residuals or emesis
- Can achieve calm, organized state (QUIET ALERT)
- Not aversive to oral stimulation
- No cough/choke/gag
- Infant able to maintain flexed position
Which baby looks ready to feed?
Infant not demonstrating readiness

- Mouth agape
- Low tone
- Arms at sides unable to maintain flexion
- No rooting
- Tongue up
Infant demonstrating readiness

- NNS on pacifier
- Hands to mouth
- Flexed position
- Appropriate tone
- Chin tuck
Active vs. Passive Feeder
Active Feeder

- Hands at midline
- Palmar grasp
- Engaged with caregiver
- Appears to have coordinated suck
- Chin tuck
Passive Feeder

- Arms at side
- Low tone
- Caregiver actively feeding
- Sleeping infant
- Disengaged
Recognize and Respond to infant’s cues
Feeding Basics

- Infant should be demonstrating readiness signs
- Infant must have physician’s order to orally feed
- Infant may be fed 30” prior to or following scheduled assessment time
- Remove infant from isolette or open crib
- Swaddle infant in sleep sac or blanket with hands at midline near face and with space for legs to freely move.
- Consider offering pacifier to encourage organization prior to introduction of fluid.
- Place infant in *sidelying* or other position if indicated
Feeding Basics Cont.

- Initiate feeding with slow flow nipple (or other nipple if indicated).
- Touch nipple to infant’s lips allowing infant to open jaw and latch onto nipple.
- Introduce fluid and watch for signs and symptoms of stress.
Feeding Basics Cont.

- Attend to infants suck swallow breath triad and watch for patterns.
- Suck, Swallow, Breath Triad
  - Definition
  - Most preterm infants have multiple sucks and swallows per breath.
  - A mature pattern is 1 suck: 1 swallow: 1 quick breath
- If needed, offer external pacing to infant.
Why side-lying?

- Most natural position for breastfeeding
- Helps volume fill into the stomach (gravity assisted) and promotes gastric emptying
- Left sidelying decreases upper esophageal sphincter (UES) pressure and decreases GER symptoms
- Right sidelying has been shown to improve gastric emptying although that is not a typical concern of preterm infants.
- Allows for easier burping
Signs & Symptoms of Stress

- Apnea/Bradycardia
- Tachypnea/Increased work of breathing/Subcostal retractions
- Stridor
- Poorly coordinated suck/swallow/breathe triad requiring external pacing, rest breaks or other modifications
- Coughing/choking
- Color change
- Gagging, lingual protrusion
- Poor endurance across the feeding, baby falls asleep, disengages
- Gaze aversion, raised eyebrows, wide eyes, grimacing
- Sneezing
- Sweating
- Arching
- Hiccups
- Fasiculations of the jaw,tongue,extremeties
- Straining
- Change in tone (increasing hypertonicity or hypotonicity)
What is External Pacing?

- “A technique in which the caregiver, upon noting that the infant needs to take a breath or is overwhelmed by volume, may tip the bottle (not the infant) downward, allowing fluid to flow back into the bottle while leaving the nipple in the infant’s mouth.” (Ludwig, 200?)

- This modification is dependent on the caregiver to carefully monitor the infant’s cues and stress signals as a dynamic aspect of the infant’s feeding.

- Pacing should always be based on the individual infant and dependent upon the infant’s ability to coordinate the suck/swallow/breathe triad and based on their individual cues.
How to pace

- Tip infant and bottle forward so the infant can finish swallowing what is in the mouth and take a breath without sucking more liquid into his mouth.
- Or “strict pacing” refers to removing bottle from mouth every 4–6 sucks.
Feeding Basics: Burping

- Continue allowing infant to feed until s/he indicates readiness for burping.
- Readiness signs for burping:
  - Change in SSB rhythm
  - Failure to initiate suck
  - Retracting or pulling away
  - Discomfort
- Infants typically need to burp every 20–30 ml however, frequency of burping is infant dependent.
Multiple ways to burp:

- **Massage v. Patting**
  - Massage is less disruptive
  - Patting may cause… (Chappel, 2013)

- **Shoulder burping**
  - Good for end of feeding and older infants

- **Prone burping**
  - Good for infants with GER and stomach discomfort
  - Encourages alert state
If infant is gulping or dribbling, slow the flow down and offer pacing.

Match nipple types to infant based on suck strength, respiratory status, and S/S/B coordination.
What are signs & symptoms of GER?

- Arching with strong extensor tone
- Head turning, usually to the right
- Emesis
- Gagging/Coughing
- Difficulty burping
- Uncontrolled crying during feed despite +rooting
- Refusal to latch/pursed lips
- Reswallowing
- Inability to complete PO feed
When to discontinue oral feeding

- Infant develops signs and symptoms of stress (disengagement cues), including:
  - Tachypnea – Increased RR >60–70
  - Apnea/Bradycardia
  - Facial Grimace/Refusal to relatch
  - Limp tone with poor arousal
  - Uncontrolled dribble despite modifications of slower flow
  - Uncontrolled inspiratory stridor
  - Gulping and pulling back
  - After 20–30 minutes, and infant not completing
Clenched Jaw
Always remember...

- DO NOT FORCE FEED
- DO NOT turn the nipple to “pump” volume
- DO NOT use excessive jaw or cheek support
- DO NOT feed sleeping baby
- DO keep noise down, dim the lights and swaddle during the feed
- DO encourage interaction/bonding after the feed, including skin to skin
How slow should I go?

- A slower flow nipple is safest.
- If infant is dribbling/gulping, then the flow is too fast!
- Slowest to Fastest Nipples/Bottle Systems:
  - Playtex Vent Aire: Slow
  - Dr. Brown Preemie—Dr. Brown Ultra Preemie (12/2013)
  - Mead Johnson Slow Flow – Comparable to Evenflo newborn
  - Dr. Brown #1
  - Enfamil/Blue Ring– Comparable to faster flow newborn commercial nipple
  - Avent, Tommy Tippee, Medela are all fast flow bottle systems.

Read this great article: Go With The Flow (Kelli Tracy Jackman, MPT, Newborn & Infant Nursing Reviews 13 (2013) 31-34)
Why the need for change?

“If the focus of the feeding is solely on volume, the feeder may not consider the infant’s physiologic stability, and the feeding may be counterproductive” (Ross, 2008).
What is Cue Based* Feeding?

- An infant driven approach to feeding
  - “Nipple feedings initiated in response to the infant’s behavioral cues and ends when the infant demonstrates satiation” (Tosh & McGuire, 2007).
  - Moves away from a volume driven culture to an infant driven culture.
  - Includes both breast and bottle feeding

*may also be referred to in literature as semi-demand or modified ad-lib
Why change to Cue Based Feeding?

- Developmentally Supportive
- Evidence Based Practice
- Baby friendly
- Benefits infant
  - “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).
- Benefits caregivers
Benefits for Infants

- Shortens length of stay
- Earlier transition to full oral feeds
  - In a study by Kirk et al (2007), infants using this regimen “achieved full oral feedings 6 days sooner than the control group.”
- ↓ incidence of oral aversion
- Consistent care across caregivers
- Infant controls the feeding progress
- Breast feeding experience is improved
Benefits for Nurses

- Nurse autonomy
- Eliminates pressure of feeding a disengaged infant
- Developmentally supporting infant
- Application of evidenced based practices
- Opportunity to educate parents about behavior responses
- Consistency across all caregivers
- Sensitive care giving
Sensitive Care Giving

“Sensitive care giving involves recognizing and attending to the infant’s cues to determine when protection and support are needed, knowing when to allow the infant to regulate his own feeding behaviors, proactively structuring the feeding from moment to moment to support safety, and intervening during feeding contingent on cues from the infant signaling inability to self-regulate” (Thoyre, 2003; Shaker, 1999).
**How does this work?**

- Once an infant is $\geq 33$ weeks PCA (post conceptual age) and without ventilator support, MD will order “Readiness Scoring for Cue Based Feeding”. Readiness scoring is recommended for a minimum of 24 hours.

- Bedside nurse will provide Parent Education Handout (example on next slide)
How will we decide if the baby is ready to orally feed?
We have developed a readiness scale that will score your baby’s readiness based on their behavior. The scores range from 1-5, with 1 being the poorest and 5 the best.

5. Awakens at or before scheduled feeding time, alert or fussy. Rooting and/or hand to mouth, takes pacifier.
4. Drowsy or alert once handled. Able to elicit rooting or takes pacifier.
2. Sleeps through care. No hunger cues.
1. Stops breathing, drops heart rate, or decreased oxygen saturation with care. Increased respiratory rate or increased heart rate over baseline.

Based on the cues your baby exhibits they may try to orally feed one time in 24 hours, or up to 6 times. Some oral feeds may be back to back.

How do I get my baby ready to orally feed?
- Swaddle
- Turn down lights
- Provide opportunity for non-nutritive sucking (with pacifier or gloved finger)
- Avoid rocking or stroking (extra stimulation)
- Limit sound (no TV/radio, speak quietly)

Once oral feeds start how will I know how they are going?
Oral feeding quality scale measures five areas:
- Alert state
- Suck/swallow/breathe coordination
- Fluid loss
- Work of breathing
- Amount of feed taken

Each area gets a score of 0, 1, or 2; two being the best and zero the poorest. The highest total possible score will be a 10. We don’t expect our babies to score 10’s all of the time. Scores of 8 or higher are acceptable.

How can I help improve the quality of my baby’s oral feeding?

**DO**
- Be flexible
- Sidelying position
- Appropriate nipple/bottle selection
- External pacing
- Light touch to skin

**DON’T**
- Active movement of cheek and chin
- Firm cheek support
- Lay baby down
- Twist and juggle the nipple

***Staff can help you learn these techniques.***

How will I know when my baby is done with an oral feed?
The infant may show signs they need to stop (disengagement cues):
- Stops breathing and drops heart rate
- Decreased O2 saturation
- Increased head bobbing/work of breathing
- Infant gets floppy
- Avoidance behaviors (pushing nipple out, head turning, stop signs, shutting down)
- Color changes
- Gagging, hiccupping, sneezing, coughing

If these disengagement cues happen more than once during a feed, the feeding should be stopped.
How does this work?

- Document parent education
- Readiness Score will be calculated prior to each feeding.
<table>
<thead>
<tr>
<th>Score</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>Awakens at or before scheduled feeding time. Alert or fussy. Rooting and/or hands to mouth, takes pacifier.</td>
</tr>
<tr>
<td>4</td>
<td>Alert once handled. Able to elicit rooting or takes pacifier.</td>
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<tr>
<td>3</td>
<td>Briefly alert with care. No hunger cues (crying, rooting, sucking.)</td>
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<tr>
<td>2</td>
<td>Sleeps through care. No hunger cues.</td>
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<tr>
<td>1</td>
<td>Stops breathing, drops heart rate, or decreased oxygen saturation with care. Increased respiratory rate or increased hearth rate over baseline.</td>
</tr>
</tbody>
</table>
Now what?

- Once an infant scores 4 or 5 on 50% of assessments (or 4 of 8) during a 24 hour period, obtain orders to “Begin Cue Based Feeding”
- Readiness Scores will continue to be documented prior to each feeding on the tracking form.
- IF the infant presents with RR >60, the score is a 1, \textit{regardless of alertness or presence of rooting}.
If Readiness Score is <4...

- Document Readiness Score (1 to 3)
- Provide gavage feeding
- Score for readiness at next scheduled feeding time
If Readiness Score is 4 or 5...

- Bottle or breast feeding should be initiated.
While feeding...

**DO**
- Be flexible
- Use side lying position
- Choose the appropriate nipple
- Provide pacing if needed
- Light touch to chin

**DON’T**
- “Pump” chin
- Twist, twirl or jiggle the nipple
- Provide cheek support
Factors identified as supporting the feeding process include:

1. An alert infant
2. Infant able to pace the feeding
3. Motor competence
4. Non-nutritive sucking
5. An appropriate nipple
6. Use of skin-to-skin care
Quality vs. Quantity

- If the quality of the feeding takes priority over the quantity ingested, feeding skill develops pleasurably and at the infant’s own pace.
  

- “It is critical to consider how the preterm infant experiences feeding early on, and the conditions and strategies that may serve to be protective from developing a feeding problem that endures.”

STOP the feeding

- If during the feeding an infant shows 2 or more disengagement cues, the feeding should be stopped and remainder provided via NG tube.

- **DISENGAGEMENT CUES:**
  - Apnea or Bradycardia
  - Desaturation
  - ↑ work of breathing
  - Decreased tone/infant becomes limp
  - Avoidance behaviors
  - Gagging, straining, sneezing, hiccups, coughing

**NOTE:** time limit of bottle feeding is still 30 minutes
If the infant did not complete full volume, gavage the remainder.

Calculate a Quality Score according to the infant’s:
- alertness
- suck/swallow/breathe (SSB) coordination
- fluid loss
- work of breathing (WOB)
- volume percentage
Quality Score Components

Alert
2: Maintains alert state throughout feeding
1: Signs of fatigue but continues feeding
0: Falls asleep or shuts down (end feeding)

SSB Coordination
2: Maintains safe SSB coordination throughout
1: Disorganized SSB. May require: specially nipple, thickened feeds, external pacing, or position change.
0: Uncoordinated SSB resulting in bradycardia or desaturations

Fluid Loss
2: No fluid loss
1: Fluid loss resulting in less than 2” diameter of fluid on cloth
0: Excessive fluid loss as evidenced by: fluid loss =2” diameter

Work of Breathing (WOB)
2: No increase in WOB
1: Increased WOB: Tractions, RR or head bobbing
0: Significant WOB requiring feeding to be discontinued: nasal flaring, arching, pulling away from nipple or turning head

Volume Percentage
2: 100% volume taken
1: 50-90% volume taken
0: <50% volume taken
Quality Score

- Quality score is found by adding the 5 components.

- Scores of 6–10 are acceptable

- A physician order for OT/ST services is indicated if scores are consistently <6.
The Cue Based Feeding Chart contains:
- Readiness Score – calculated prior to the feed to determine bottle/breast OR gavage feed.
- Quality Score – calculated after the bottle/breast feeding.

Each allows staff to document all eight assessments required in a 24 hour period and allows up to 4 days of charting.
# Cue Based Feeding Chart

<table>
<thead>
<tr>
<th>Date/Time: __________</th>
<th>0800</th>
<th>1100</th>
<th>1400</th>
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<tr>
<td>READINESS SCORE: 1-5</td>
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<td>QUALITY SCORE:</td>
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<td>Fluid Loss: 0-2</td>
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<td>Work of Breathing: 0-2</td>
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<td>Volume Percentage: 0-2</td>
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<td>Nipple Used</td>
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<td>Feeder (RN, OT, mom, etc.)</td>
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# Cue Based Feeding Chart Example

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**Readiness Score: 1-5**

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<th>Score</th>
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**Quality Score:**

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<thead>
<tr>
<th>Score</th>
<th>Alert : 0-2</th>
<th>SSB coordination: 0-2</th>
<th>Fluid Loss: 0-2</th>
<th>Work of Breathing: 0-2</th>
<th>Volume Percentage: 0-2</th>
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</table>

**Nipple Used**

- Slow flow
- Slow Flow
- Slow flow

**Feeder (RN, OT, mom, etc.)**

- OT/CS
- Mom
- RN/AD
Documentation

- Readiness Score and Quality Score should be tallied until:
  - The baby has gone 48 hours without a gavage feeding (i.e. all feeds bottle or breast)
  - OR
  - The physician/NNP orders to remove the gavage tube.
Potential Difficulties

As we begin to follow an infant driven feeding culture, we must all be flexible as this will impact the schedules of Parents, Nurses, Occupational Therapist, Speech Pathologist, and Lactation Consultants.

Creating a new culture takes time and can be difficult.

“Newborn intensive caregiving involves the recognition that each infant is both a recipient and an active participant in care.” Lawhon, Gretchen (2002).
Parents Experience Difficulties After Discharge

“While most infants are discharged from the hospital to home taking full breast or bottle feedings, many of these infants over time show negative feeding behaviors and slow velocity in their growth.”

Q: Is “Cue Based Feeding” the same as “On Demand Feeding”?

A: NO…in ”Cue Based Feeding” the infant determines the route in which they are fed; however she is still fed on a strict schedule. With “On Demand Feeding” the infant determines how frequently she is bottle fed.
Q: Will cue based feeding take more time?

A: **NO**, if a baby is awake and interested, the feeding will be more prompt. If a baby is not showing hunger signs, they will be tube fed.
Q: Should I try to wake the infant to bottle feed?

A: **NO** -- External stimulation (unswaddling, rocking, using a cold washcloth) should be kept to a minimum as this may disrupt their neurobehavioral organization.
Q: Why can’t I “pump” the chin or give cheek support?

A: “When oral manipulation …is used to increase flow volume, the baby often experiences too much milk to swallow which provides negative feedback and the feeding may worsen, ultimately leading to oral aversion” (Ross & Brown, 2002).
Q: What can I do to stimulate the infant rather than twist or twirl the bottle?
A: You can use negative resistance by gently pulling the bottle back allowing the infant to maintain the lingual seal on the nipple, if the infant initiates this is a good indication the infant is still engaged in the feeding. If the infant does not initiate sucking, he may need a rest/burp break to reorganize, if he is not demonstrating cues of disengagement. A breast feeding mother would not twist, twirl or turn her nipple in the infant’s mouth.
Q: Doesn’t a slow flow nipple make the feeding go slower?
A: NO – sometimes a slower nipple is beneficial to decrease stress that may be caused by the infant trying to keep up with the flow rate. The infant is able to feed more safely and efficiently with a slow flow nipple.
Frequent Questions Cont.

Q: Can the family purchase the green and blue rimmed nipples or ANY hospital issued single use nipple for home use?

A: NO. These are hospital single–use only and are not available commercially. When a baby reaches 6/8 PO, encourage family’s to trial home bottle systems and establish a feeding system for safe, positive feedings after discharge.
Frequent Questions Cont.

Q: Why position the infant in side-lying?
A: Multiple reasons:
  • It is the natural breast feeding position
  • ↓ flow rate by eliminating gravity’s effect
  • ↓ pressure on the lungs and diaphragm
  • ↓ GER signs and symptoms (left side-lying)
Supporting Breastfeeding Through Bottle Feeding

“Feeding position, nipple flow rate, and nipple shape ALL have the potential to affect breastfeeding success. Studies measuring physiologic stability showed improvement in both heart rate variability and oxygen saturation while bottle feeding in an elevated side-lying position (breastfeeding position) vs. the traditional upright position. Bottle feeding in this position may have a beneficial effect on breastfeeding by creating positive associations with feeding related to increased physiologic stability.”

- Bottlefeeding the Breastfed Infant in the Neonatal Intensive Care Unit
Future Cue Based Feeding Experts

- Nursing staff
  - Nurse technicians
- Lactation Consultants
- Speech Pathologists
- Occupational Therapists
  - MDs
  - Parents
Please remember...

- We want feedings to be enjoyable for both the infant and the caregiver.

- We all want to support the best developmental care for our patients.

- If the infant is allowed to drive the feeding, the pressure of volume driven feedings will be eliminated and we will thrive together as we allow the infant’s to cue their way to safe, positive oral feedings.
Final thought:

- “If we promote a positive developmental experience early on in the baby’s life and offer support for parents to learn these specialized techniques to promote development, then we help pave the way for successful parenting.”
  - Sandy Keefe, MSN, RN

- Hunger Based NICU Feeding
An adaptation from:

Developmentally Supportive Feeding: A Cue Based Approach

Nationwide Children’s Hospital
700 Children’s Drive
Columbus, Ohio 43205–2696
References