Responding to preemies’ cues goes a longer way to helping them feed than focusing on intake.  

BY CATHERINE S. SHAKER

Reading The Feeding

Two nurses are feeding preterm infants in the neonatal intensive care unit. Transitioning from tube feeding, the babies are just learning how to coordinate their sucking, swallowing and breathing. Preemies must be able to feed and gain weight to be allowed to go home, so caregivers carefully monitor their intake.

The first nurse is well versed in all the techniques long used in NICUs to get reluctant feeders to eat: faster-flow nipples, cheek and jaw support for the infant, and prodding and twisting the nipple to expel more liquid. The infant intermittently fusses, arches his back, falls into a light sleep, and formula spills out of his mouth, but the feeding continues until the desired goal is achieved: The bottle is empty. The exhausted infant falls asleep immediately.
The amount of milk a preemie drinks largely determines readiness for discharge from the neonatal intensive care unit. But it is a short-term measure of success. The fact is, feeding problems in preemies can endure for months, even years. Perhaps a more important measure is the infant’s long-term positive response to feeding. How can NICU caregivers help foster that measure of success? One answer may be to ensure that NICU feeding experiences are positive for the preemie, regardless of intake. Increased intake will come with positive learning. **TAGS > PREMATURE, FEEDING, NICU**
The second nurse is aware of all the techniques, too, but doesn’t use them. She pays close attention to the infant’s breathing and swallowing patterns and allows him to rest. She makes sure the flow rate doesn’t overwhelm him by helping him slow down and using a slow-flow nipple. When he drifts off, she gently re-awakens him, and when he begins to fuss, she calms him. When he stops sucking, she lets him be done. The infant finishes about two-thirds of the bottle.

Which infant has had a more successful feeding?

The answer may depend on the definition of success. Clearly, volume is an important measure of feeding integrity required for discharge from the NICU, and is a short-term measure of success. But many researchers have reported enduring feeding problems in preemies that last months and even years, so perhaps a more important measure is infants’ long-term positive response to feeding.

How can NICU caregivers help foster that measure of success? One answer may be to ensure that NICU feeding experiences are positive for the preemie, regardless of intake. Increased intake will come with positive learning.

A dynamic system

In the NICU, preemies are developing motor and sensory neuropathways. Researchers are finding that stress during feeding—including, perhaps, well-intentioned efforts to increase the infant’s intake—may alter sensory-motor pathways in the brain that guide the infant away from feeding and affect the ability and desire to feed. The infant may experience these effects not just in the NICU, but after discharge as well.

Feeding can be stressful for preterm infants, and they indicate their ability to cope with that stress through their heart and respiratory rates, how hard they work to breathe, their oxygen saturations, and their suck-swallow-breathe synchrony. Caregivers must be alert for changes in these parameters to avoid serious consequences of instability—apnea, slow heart rate, rapid breathing, color change, and loss of state arousal and/or postural control—which can affect control of the larynx, pharynx and esophagus, and potentially lead to laryngeal penetration or aspiration.

When an infant feeds, these physiologic systems are constantly interacting; nothing happens in isolation. Infant behaviors during feeding are a direct reflection of system interactions, and must be interpreted from that perspective. For example, an infant whose breathing is disrupted may compensate by changing his sucking pattern or moving to light sleep. He may try to reduce the amount of fluid entering his mouth by limiting his jaw and tongue movements, pushing the nipple out, or purposefully stopping sucking altogether. He exhibits these behaviors because his physiologic stability affects his drive to suck and willingness to stay alert. The infant behaves certain ways during feeding for a reason.

A caregiver who doesn’t realize these are compensatory strategies may think the preemie has sucking problems and, like the nurse in the first scenario, apply an intervention—such as increasing the flow rate—that ignores the underlying issue and can override the infant’s beneficial compensatory strategies. The infant then “fights the flow” to breathe, with resulting decreases in oxygenation that may compromise his physiologic stability. The decreased oxygen leads to a loss of coordinated feeding behaviors as the infant attempts to protect his airway. This compromise in physiologic stability may lead to apnea and/or altered heart rhythms. Accumulation of these responses to physiologic instability may, in turn, create a pattern of stress and feeding refusal behaviors.

Therefore, focusing on emptying the bottle, or defining an empty bottle as success, may alter the preterm infant’s feeding experience and adversely affect neuromaturation and feeding outcomes. If each feeding is as stress-free as possible, however, the infant learns to respond positively to feeding.

Cue-based feeding

Imagine helping a medically fragile adult—someone recovering from surgery or prolonged illness who needs to gain weight and strength—to eat. If the patient tells us she’s full or would like smaller bites, we would honor those requests. We might encourage her to eat more, but would respect her wishes about the pace and quantity of her meal. We also might look for ways to make eating more pleasurable for her, perhaps by bringing her favorite foods or having a meal with her.

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communicative interaction, the caregiver can anticipate the infant’s needs from moment to moment during feeding, avoiding the need to “rescue” an infant who eventually communicates through a major event of physiologic decompensation, such as decreased heart rate or apnea.

As the quality of a feeding takes priority over the quantity ingested, feeding skill develops pleasurably and at the infant’s own pace, and intake improves. In this infant-guided, co-regulated approach, caregivers support feeding success by using the infant’s cues to inform their feeding decisions and actions.

What to do
Speech-language pathologists supporting preemies learning to feed in the NICU and their caregivers may have an effect on both short- and long-term success by focusing on the infant’s cues. They may help caregivers provide positive feeding experiences, recognize early signs of stress during feeding, and respond immediately and specifically with supportive interventions.

Preemies communicate their readiness and tolerance for feeding as well, although interpreting their cues requires a much more concentrated effort. What if NICU caregivers allowed the infant’s cues to guide the pace of the feeding? This method shifts the focus from “getting infants to eat”—and the well-intentioned goal of getting them home—to providing individualized feeding experiences based on the infant’s needs at a specific time.

Cue-based feeding assumes that preemies actively communicate through their behavior, which provides information to the caregiver about the infant’s thresholds of stress versus stability. The caregiver, in effect, partners with the infant during feeding: The infant offers behavioral and physiologic signs to a caregiver, who interprets them, selects contingent interventions that support and strengthen the infant’s efforts, and respects the infant’s limits.

The infant’s cues tell the caregiver about the flow of milk; ability to tolerate bolus size; optimal length of sucking burst; need for more postural support; need for re-alerting or calming; when feeding should be started, paused or stopped; and if swallowing and breathing are no longer synchronized. The caregiver’s subsequent interventions need to be dynamic—that is, specific to the infant’s need at that moment and continuously re-evaluated based on the infant’s continuous communication.

In this model of feeding, arbitrary interventions—such as routinely pausing the infant after a specified number of sucks—give way to co-regulated pacing, in which the infant’s communication guides the timing, frequency and length of the pausing provided by the caregiver. Through this ongoing

**Volume-driven strategies that may result in negative feeding experiences**

- Increasing flow rate
- Prodding
- Unhelpful chin/cheek support
- Unsaddling
- Putting head/neck back

- Continuing to feed despite:
  - Signs of physiologic instability
  - Swallow-breathe incoordination
  - Signs of disengagement
Signs of stress may include:
- Change in state of alertness.
- Change in postural control, tone or movement patterns.
- Change in cardio-respiratory behavior.
  - Color change from baseline (pallor, cyanosis)
  - Respiratory fatigue
  - Tachypnea (rapid breathing)
  - Nasal flaring and/or blanching
  - Chin tugging
  - Shallow, short breaths instead of a series of deep breaths
  - Unstable saturations
  - Decreased heart rate, apnea
- Lack of synchrony (uncoupling) between swallowing and breathing.
  - Loss of bolus control orally (drooling)
  - Gurgling
  - Gurgling sounds on the pharynx
  - Multiple swallows to clear bolus
  - Coughing and/or choking
Caregivers should choose infant-guided interventions that minimize the infant’s stress:
- Offer a more controllable flow rate.
- Offer a side-lying position.
- Offer supportive swaddling to optimize postural stability and control.
- Offer co-regulated pacing during feeding to avoid uncoupling of swallowing and breathing.
- Use re-arousal or calming to help regulate the infant’s arousal state.
- Use a developmentally supportive framework for feeding with preterms and their families.
- Avoid prodding.

Recent research has looked at the impact of a feeding approach that uses the infant’s behavioral and cardio-respiratory signs to guide feeding duration, frequency and volume. In two studies with healthy preterm infants at 32–34 weeks post-conceptional age, bottle feedings were offered to an experimental group based on the infants’ physiologic and behavioral responses. A study by Anderson and colleagues in “Key Aspects of Recovery: Improving Nutrition, Rest and Mobility” found that experimental infants gained more weight than controls whose feedings were not guided by infant observations but rather offered according to standard care (volume indicators). In a second study by McCain and colleagues in the Journal of Pediatrics, the experimental infants achieved full bottle feeding sooner than the controls.

Two studies in Nursing Research show similar results with preterm infants with bronchopulmonary dysplasia, a serious lung condition often affecting the smallest and sickest preemies. In “Transition From Gavage to Nipple Feeding for Preterm Infants with Bronchopulmonary Dysplasia,” infants whose feedings were offered based on their cardio-respiratory and behavioral responses achieved full bottle feeding five to six days sooner than similar infants fed using a standard approach based on the volume they were able to ingest. “Coregulated Approach to Feeding Preterm Infants With Lung Disease” demonstrates that using the infant’s cues as a guide when feeding infants born at less than 32 weeks’ gestation resulted in less variability in oxygen saturation, more stable saturations, less heart rate fluctuation and decline, improved swallowing and less excessive breathing effort.

**Cue-based feeding at its best**
In volume-driven feeding, success is measured by how much an infant ingests, and caregivers may use strategies intended to empty the bottle without regard to what the infant communicates (see chart on p. 45). Volume-driven caregiving tends to feed past the infant’s “stop” signs, which
say, “I want to stop, I am done” (see chart on p. 46). Failure to respond to the infant’s communication may lead to maladaptive feeding behaviors, learned feeding refusals and long-term feeding aversions. Caregivers often pass on this volume-driven philosophy to parents, for whom feeding becomes something they do “to” their infant, instead of a relationship-based experience through which communicative interactions build trust.

The experience of feeding, for the preterm infant and for parents, is strongly influenced by the assessments, decisions and actions of NICU caregivers. When feeding is neither cue-based nor individualized to the infant’s continuous feedback, the approach to feeding becomes task-oriented rather than relationship-based. If staff know enough about the communication cues of preterm infants during feeding, can provide true “cue-based” feeding and appreciate its central importance, the NICU feeding culture can be transformed from volume-driven to one in which the infant’s earliest communication guides caregivers and, in turn, parents. This is the difference between “being fed” and being “supported to feed” through infant-guided co-regulation. This is cue-based feeding at its best.

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