Infant-Guided, Co-Regulated Feeding in the Neonatal Intensive Care Unit. Part II: Interventions to Promote Neuroprotection and Safety

Catherine S. Shaker, M.S., CCC-SLP, BCS-S

ABSTRACT

Feeding skills of preterm neonates in a neonatal intensive care unit are in an emergent phase of development and require careful support to minimize stress. The underpinnings that influence and enhance both neuroprotection and safety were discussed in Part I. An infant-guided, co-regulated approach to feeding can protect the vulnerable neonate’s neurologic development, support the parent–infant relationship, and prevent feeding problems that may endure. Contingent interventions are used to maintain subsystem stability and enhance self-regulation, development, and coping skills. This co-regulation between caregiver and neonate forms the foundation for a positive infant-guided feeding experience. Caregivers select evidence-based interventions contingent to the newborn’s communication. When these interventions are then titrated from moment to moment, neuroprotection and safety are fostered.

KEYWORDS: Premature neonates, feeding, neuroprotection, infant-guided, cue-based, family-centered care

Learning Outcomes: As a result of this activity, the reader will be able to (1) describe two studies that supporting flow rate regulation; (2) list two benefits of resting; (3) list two ways to support parental confidence and competence.

Feeding skills of preterm neonates in a neonatal intensive care unit (NICU) are in an emergent phase of development and require careful support to minimize stress. The underpinnings that influence neuroprotection and safety were discussed in Part I.1 Neonatal intensive care units (NICUs) are developing centers with high-expectancy outcomes, which include rapid delivery of high-quality care using evidence-based interventions. NICUs maintain the balance of safety and neuroprotection for infant feeding. Caregivers select evidence-based interventions contingent to the newborn’s communication. When these interventions are then titrated from moment to moment, neuroprotection and safety are fostered.

1Department of Pediatric Rehabilitation, Florida Hospital for Children, Orlando, Florida.
Address for correspondence: Catherine S. Shaker, M.S., 601 East Rollins Street, Orlando, FL 32803 (e-mail: Catherine.Shaker@FLHosp.org).
Pediatric Dysphagia; Guest Editor, Gilson J. Capilouto, Ph.D., CCC-SLP, ASHA Fellow.

care for preterm neonates has advanced over the past three decades, such that neonates born as early as 22 weeks’ gestation may survive due to technological innovations. This progress comes with great costs, including risk for a variety of developmental problems. The inherent stress for preterm neonates in the NICU, and its effects, suggest that all NICU care must be embraced as “trauma-informed care.” An infant-guided, co-regulated approach to feeding may protect the vulnerable newborn’s neurologic development, support the parent-infant relationship, and prevent feeding problems that may endure. The goal is for all caregivers to partner with the neonate to build a trusting feeding relationship. Neonatal feeding behaviors guide the caregiver, because they indicate stress and reflect adaptations the neonate makes to maintain stability. Caregivers select contingent interventions to protect and enhance the newborn’s feeding experience with sensitivity, appreciating the neonate’s clear, though sometimes subtle, communication. Interventions need to be dynamic (i.e., specific to the neonate’s need at that moment and continuously titrated based on the neonate’s communication). Too often feeding interventions are applied generically. When interventions are not individualized to the newborn’s continuous feedback, the approach to feeding will be task-oriented versus relationship-based. This second article of a two-part series focuses on evidence-based interventions.

NIPPLE FLOW RATE

Nipple flow rate will vary per the nipple selected. Using flow rate ratings provided by the manufacturer may be misleading. The nipple marketplace is not regulated and therefore some nipples may be labeled “slow flow” without any objective data. Relevant research remains the best guide.

NICU neonates often have intermittent, if not frequent, tachypnea and baseline increased work of breathing related to prematurity or chronic lung changes. This baseline respiratory work often creates both endurance and safety concerns during oral feeding. The aerobic demands of feeding superimposed on a baseline of increased cardiorespiratory work serve to increase the risk for aspiration. Yet caregivers often increase the flow rate of the bottle nipple (i.e., regular flow versus slow flow) as a “solution” for the neonate who does not ingest sufficient volume or does not feed quickly, with the well-intentioned goal of getting the newborn home. Although medium- and high-flow nipples help to “empty the bottle,” there is no evidence that increasing the flow facilitates a safe swallow or promotes cardiorespiratory stability. In fact, a faster nipple flow rate can result in both physiologic stress and negative feeding behaviors for the neonate, who may struggle to breathe when swallowing and breathing compete. Given the inherent aerobic demands of feeding, respiratory fatigue may compound the stressful experience. In addition, a well-intentioned caregiver may steer the neonate back to sucking and ask the newborn to continue feeding when he or she has disengaged. The risk to aspirate likely increases.

An “infant-guided” approach to feeding optimizes respiratory stability, swallowing safety, and positive learning experiences for the neonate. It best supports the long-term goal of good growth, pulmonary health, and parent-infant attachment. Research regarding flow rate and its impact on both intake and cardiorespiratory workload supports the importance of a manageable flow rate to minimize physiologic stress, which results in improved safety and intake.

A manageable flow rate promotes what Goldfield called islands of stability for breathing and avoids the need for an urgent breath, which can lead to a cascade of physiologic decompensation, including desaturation, apnea, and bradycardia. When a flow rate beyond the newborn’s capacity inhibits the essential “windows of opportunity” necessary for imposing breaths, the bolus may be misdirected toward/into the airway with that breath, leading to either symptomatic or silent aspiration. Sucking, swallowing, and breathing processes must act together during feeding, working smoothly and efficiently with highly accurate timing and coordination. A slower flow rate may assist the preterm neonate with both maintaining baseline respiratory reserves as well as support the timing of the dynamic airway adjustments (opening and closing) that surround the actual swallow. Ventilation is adversely affected, even in healthy term neonates, when both breathing frequency and
depth are not optimally supported, due to the time required to swallow a larger volume of fluid from a faster flowing nipple. Al-Sayed and colleagues reported that slowing the rate of milk flow reduced ventilatory compromise.\textsuperscript{10,11} Their work suggests that a slower flow rate, which reduces how frequently the neonate needs to swallow, is likely to avoid the onset of respiratory fatigue and its attendant sequelae.

Many caregivers in the NICU express concern that preterm neonates are working too hard with a slow flow nipple. It is important to note that any nipple ring tightened excessively will create a vacuum that does indeed require “more work” and could create an artifact of fatigue. Just “hand turning” the nipple ring to close it, but not “man turning it,” averts creating a vacuum. Fatigue issues observed with slow-flow nipples are typically related to the method of fastening the nipple. This is not flow related but rather caregiver related.

Concern is also expressed by NICU caregivers that preterm neonates get less volume when using a slow flow nipple; however, this has not been supported by research. Lau et al hypothesized that preterm neonates would feed more if the nipple flow rate were unrestricted, versus if milk flowed only when the newborn was sucking (restricted).\textsuperscript{12} Proficiency (percent volume transferred during first 5 minutes of a feeding/total volume ordered), efficiency (volume transferred per unit time), and overall transfer (percent volume transferred) were calculated. Restricted (i.e., infant-guided) flow rate enhanced all three parameters. With a slower flow rate, neonates were less likely to struggle with milk flow when they needed to pause to breathe. A more manageable flow rate promotes the essential respiratory reserves to “go the distance” like marathon runners, as it allows for frequent and deep breaths.

In a study by Mathew,\textsuperscript{13} the author concluded that preterm neonates purposefully used significantly lower sucking pressures when feeding using a high-flow nipple as compared with a slow-flow nipple. He hypothesized this may have been the neonate’s attempt to manage or “slow” the flow to allow for necessary breathing. Minute ventilation also decreased with higher-flow nipples, suggesting higher flow may not be supportive of cardiorespiratory stability. Mathew postulated it is not the work of sucking that makes feeding hard for preterm neonates, rather it is trying to breathe in the presence of flow rate that interferes with breathing of adequate depth and frequency.\textsuperscript{13}

Although increasing the flow rate is considered by some caregivers in the NICU as essential to intake, flow rate is negatively correlated with feeding efficiency. Using a randomized controlled trial, Chang and colleagues observed that preterm neonates were more physiologically stable and fed more with a slower flow nipple than with a faster flow nipple.\textsuperscript{14} Study results reinforced earlier work by Eishima,\textsuperscript{15} who reported that newborns who demonstrated a strong rhythmical suck-swallow-breathe pattern with a regular flow rate nipple changed their sucking pattern to compression-only sucking when the flow was increased, to reduce flow and allow for breathing.

Meier’s work on flow from the breast versus man-made rubber nipples demonstrated that the neonate’s ability to control the flow from the breast (i.e., to stop flow by slowing sucking rate and reducing sucking pressure) underlies the exquisite physiology of breast-feeding.\textsuperscript{16} Nyqvist reported that even tiny 29-week postmenstrual age neonates in breast-feeding friendly Sweden fed small volumes at breast with physiologic stability.\textsuperscript{17} Both Meier’s and Nyqvist’s findings suggest that a controllable flow rate is ventilatory-sparing and creates opportunities for breathing to occur. When the newborn can breathe as needed, physiologic stability is maintained, and this promotes safe and efficient feeding, as well as intake.

Pados and colleagues recently looked at the effects of milk flow on the physiologic and behavioral responses to feeding in newborns with hypoplastic left heart syndrome.\textsuperscript{18} As with many NICU neonates with chronic lung disease, baseline cardiorespiratory work creates both endurance and safety concerns during oral feeding.\textsuperscript{5,6} They reported that the slower flow (unlike the standard flow) allowed the study neonates to maintain a heart rate (HR) closer to baseline and a lower HR overall compared with the standard flow rate, suggesting less physiologic stress. Respiratory rate (RR) was significantly higher during slow-flow feedings, which the authors suggested may indicate that slow-flow nipples are more supportive, allowing
the newborn to breathe more often and more readily during feeding. Yet the study neonate’s average RR of 72 breaths per minute across all feedings (both standard and slow flow) is still worrisome. Given that integrating a pharyngeal swallow takes an average of 1 second, an RR greater than 60 breaths per minute creates an inherent threat to airway protection. Because the study neonate experienced adverse events with both flow rates, it reminds us that safe feeding for preterm neonates is about much more than just a controllable flow rate.

SWADDLED ELEVATED SIDE-LYING POSITION

Caregivers in the NICU, including neonatal therapists and nurses, frequently choose to feed preterm neonates in a swaddled elevated side-lying (ESL) position. They report that in side-lying position (contrasted with semiupright in the feeder’s lap), preterm neonates clinically present with improved breathing, swallowing, and physiologic stability (including more stable oxygen saturation levels, HR, and RR). Parents who learn ESL for bottle-feeding remark about the positive changes in neonatal feeding skills and their own increased comfort supporting their newborn during feeding. ESL is specifically a head-elevated side-lying position, with ear and shoulder toward the floor, with head higher than hips; the chin and sternum are in a straight line. Postural stability is provided via firm swaddling to promote midline containment and alignment, with the support of the feeder’s arm along the neonate’s back, and stable support of the head. The neonate is positioned so the caregiver can see the newborn’s face during feeding to optimally support co-regulation based on the neonate’s communication, which signals stress versus stability, including changes in facial expression, attention-interaction, color, posture, swallowing, and breathing behaviors.19 Anecdotally, this author has observed consistent improvement in the integrity of the swallow utilizing ESL with preterm neonates during a videofluoroscopic swallow study in comparison to a semiupright position.

The rationale for ESL as a position for feeding preterm neonates comes from several sources and varying levels of research evidence. Clark et al reported a significant effect on oxygen saturation levels during feeding in ESL versus semiupright position.20 Mean oxygen saturation decreased in the first 3 minutes of feeding in both positions from baseline; however, in the middle 3 minutes of feeding, the mean oxygen saturation increased in the ESL position but continued to decrease in the semiupright position. Lau compared feeding outcomes among upright, ESL, and semiupright positions.21 Unlike the other studies, Lau looked at relatively healthy preterm neonates (e.g., no lung disease) and did not consider effect of position on physiologic stability. Outcomes included postmenstrual age at full oral feeding and volume-driven outcomes (efficiency and rate of milk transfer); no differences were found between groups in these volume-driven measures. Park et al reported that preterm neonates fed in the ESL position showed less variation in HR and less severe and fewer decreases in HR, RR closer to prefeeding baseline, more regular intervals between breaths, less variation in oxygen saturations, and improved endurance for feeding.22 Further studies using a larger sample size are needed to examine the effects of the ESL position more definitively, but these early research data, along with clinical wisdom, suggest the position holds promise as a beneficial intervention.

Theoretical underpinnings and clinical observations, though not studied, suggest the ESL position may have benefits for preterm neonates. The ESL position is like the often used cross-cradle position for breast-feeding. Less disruption of breathing,9,23,24 likely related to both flow rate and positional benefits, has been reported during breast-feeding compared with bottle-feeding. Because many preterm neonates are offered both breast- and bottle-feedings, use of the ESL position may promote consistency across feeding conditions.25 The ESL position, because it is not an antigravity position, requires less energy expenditure and less musculoskeletal effort during breathing related to easier anterior-posterior rib cage movement.26 Maintaining head and trunk alignment during feeding may be easier in an ESL position compared with a semiupright position, in which the newborn’s head can inadvertently positioned back, out of
alignment. The ESL position theoretically may provide increased ability to generate subglottic pressure, due to beneficial impact of gravity on the curvilinear shape of the rib cage, as opposed to the downward pressure gravity exerts on the rib cage when in semiupright position. This potentially may functionally assist effectiveness of cough, if indeed a cough is elicited, although this has not been studied. Bolus flow toward the pharynx is less adversely affected by gravity in an ESL position, which can likely reduce potential for bolus misdirection. More organized swallow-breathe integration in an ESL position may allow neonates with higher RRs more opportunity for safe breaths. In the ESL position, the bottle is held at a lowered angle, which has a potential to slow the gravitational flow of milk by decreasing the hydrostatic pressure generated by the volume of milk in the inverted bottle. In the ESL position, the neonate can potentially latch more effectively and may swallow less air because the tongue position is at neutral. In contrast, in a semiupright position on the feeder’s lap, gravity causes the tongue to posture more in a retracted position, which can interfere with latch, suck, and swallow-breathe coordination. Mandibular movement in an ESL position appears less effortful, as gravity is working through the mandibular joint like a gate hinge. In contrast, in a semiupright position on the feeder’s lap, gravity causes the tongue to posture more in a retracted position, which can interfere with latch, suck, and swallow-breathe coordination. 

OFFERING BRIEF REST PERIODS DURING FEEDING

To preserve respiratory reserves and endurance for oral feeding, preterm neonates can benefit from periodic brief (30 to 60 second) pauses. These imposed pauses in feeding activity are provided by the caregiver to preserve energy and are timed contingent to the newborn’s communication. The short breaks during a feeding may be beneficial for neonates who have respiratory compromise due to a tendency to exhaust respiratory reserves during the aerobic demands of feeding. The short breaks allow the preterm neonate to replenish his or her oxygen reserves and gain stamina for the continued work of feeding.

Indications for resting include an increase in neonate’s work of breathing, onset of anterior bolus loss from the newborn’s mouth, change to a drowsy state, or lack of rooting response when the neonate is otherwise indicating readiness to initiate or reinitiate sucking. Providing contingent rest periods throughout the feeding may protect the neonate’s energy for feeding and avoid the newborn’s need for an urgent breath. At the beginning of the feeding, resting may promote careful titration of respiratory reserves across the entire feeding. Resting may avert bolus misdirection toward the end of the feeding when there is even greater likelihood for onset of fatigue-induced disengagement and/or incoordination. Stabilizing and sustaining efficient respirations via the combined effects of resting and co-regulated pacing clinically appear to reduce physiologic and behavioral stress.

CO-REGULATED PACING

The caregiver needs to help the preterm neonate maintain sufficient respiration to meet oxygenation needs while managing the bolus being swallowed. Integrating breaths is an emergent skill, so breaths are often both latent and of insufficient duration, which exacerbates the baseline work of breathing. Due to a tendency to use a prolonged sucking pattern, the preterm neonate’s sucking burst can easily become too lengthy, creating too long a pause in breathing and too large a bolus of milk. The large bolus may require multiple swallows to clear, delaying the onset of a postswallow series of breaths, prolonging the interruption in breathing, and resulting in the need for an urgent breath. The end point of this prolonged sucking may be that sucking eventually ceases after an extended period without respirations, with fatigue, disengagement, and inadequate intake. Alternatively, sucking may cease only after an adverse overt event occurs (choking, coughing, bradycardia, apnea) that increases the risk for aspiration. The popular concept that preterm neonates “pace themselves” (i.e., breathe when they should during
feeding) is not supported by research. Wilson et al reported that even the healthy term neonate does not consistently pause to breathe when CO2 levels require, due to delayed maturation of the necessary chemoreceptors, neuroreceptors, and laryngoreceptors. When mature, these receptors together signal the brain that a series of breaths is required. These receptors are not mature until 44 to 46 weeks of life, or 1 to 1.5 months of age in the former healthy newborn. The preterm neonate not only lacks these receptors but has innate neurologic and respiratory immaturities that likely further delay the preterm neonate’s ability to register the need to breathe and do so in a timely, effective way during feeding. The caregiver needs to titrate co-regulated pacing to assure timely and sufficient breaths.

Sucking bursts that are too long for an individual newborn can be shortened by the caregiver, moving the neonate back to breathing. The breathing phase can be prolonged by the caregiver to provide a longer series of deep breaths as needed. Caregivers need to help the neonate make these adjustments as feeding conditions change and be attentive to neonatal needs. The concept of pacing was first described by Law-Morstatt et al as an imposed pause in sucking, used to interrupt the flow of liquid from the nipple to promote organized feeding patterns. When used appropriately, it may support more frequent and deeper breaths, a stable burst-pause pattern (sucking alternated with breaths), a manageable bolus size, improved endurance, and swallowing safety. The attentive caregiver watches for a trend or pattern of subtle cues that the newborn is starting to experience physiologic stress and offers co-regulated pacing (i.e., pacing that is offered contingent to neonatal communication). The neonate typically displays changes in his RR or work, eye behavior, facial expression, and/or bolus control that suggest swallowing and breathing are becoming uncoupled, often due to the need for an urgent breath. Caregivers should aim to learn about the individual newborn’s pattern of breathing and signs of dysregulation so that feeding rhythms can be co-regulated proactively versus waiting to rescue the neonate after an adverse event.

The pacing method utilized should yield the desired results (i.e., a timely pause in sucking, followed by an immediate swallow, followed by immediate initiation of breathing). Common methods of providing pacing include: (1) keep the nipple in neonate’s mouth on his or her tongue, but tilt the bottle down to empty the nipple, and (2) keep the nipple in the neonate’s mouth but move it off the tongue toward the inside of the cheek. However, with these approaches the neonate often continues to dry suck on an empty nipple, the needed breath is delayed, and continued physiologic stress ensues. Alternatively, the caregiver can (3) gently break the seal on the nipple through lowering the base of the bottle, which drains the fluid out of the nipple, then back the nipple out of the newborn’s mouth, and immediately place the tip of the nipple on the corner of the newborn’s mouth/lips, using a firm sustained tactile cue. The author has observed that the latter method, complete removal of the nipple from the mouth with a sustained tactile cue on the lip, allows the neonate to initiate a timelier series of postswallow breaths. When the neonate is ready (from a breathing perspective) to resume sucking, the neonate then reroots on the nipple via the tactile cue. The newborn tells the caregiver when pacing is indicated and when ready to resume sucking. In this model of feeding, arbitrary interventions—such as routinely pausing the newborn after a specified number of sucks and routinely offering a specified number of breaths—give way to co-regulated pacing, in which the neonate’s communication guides the timing, frequency, and length of the pausing provided by the caregiver. Because early feeding skill is dynamic with high variability in coordination, co-regulative strategies need to be dynamic, providing more support when the newborn is less self-regulative and providing less support when the neonate demonstrates ability to self-regulate.

SUPPORTING THE NEONATE AS AN ACTIVE PARTICIPANT IN FEEDING

Preterm neonates may attempt to reduce physiologic stress during feeding by sucking with a shorter burst, not rooting due to the need to
breathe, or using a purposefully weak sucking pattern. Caregivers may try to override misunderstood neonatal responses by stimulating more sucking. If the neonate stops sucking for whatever reason, the caregiver should keep the nipple still and respect the newborn’s need to breathe. Steering the neonate back to sucking may jeopardize adequate respiration, swallowing safety, and neuroprotection. Well-intentioned “prodding” has been used by caregivers to steer the neonate back to sucking. This may include efforts to passively “encouraging sucking” if the neonate pauses, via twisting or turning the nipple/bottle, moving the nipple up and down, moving the nipple in and out, or moving the newborn’s jaw up and down. Although the intent is to help transfer volume, the neonate’s learning is interrupted and safety may be compromised, because fluid is passively expressed into the neonate’s mouth without the neonate’s active participation. Intake is then a by-product of the efforts of the caregivers, not the neonate’s skill. Caregivers should understand why the newborn is not actively sucking and respect the neonate’s pauses. Resting and/or realerting may be helpful to bring the newborn back to the task actively or, if that is unsuccessful, feeding should be terminated with respect for the neonate’s disengagement, whatever the reason.

Realerting techniques, and alternatively, calming techniques, via well-graded tactile and vestibular input, can be used to support sensory-motor organization and engagement for feeding, and the quiet alert state that best supports active skilled feeding. Neonatal state modulation typically relates to factors such as the environment, the newborn’s own developmental and medical status, and the perceived stress associated with feeding. The caregiver needs to match the approach for modifying state to each newborn, with caution to carefully assess the neonate’s response to state-related interventions. Well-intentioned repeated efforts to realert the preterm neonate may result in physiologic decompensation. Alternatively, the crying, irritable, overstimulated preterm neonate who cannot supportively transition to a well-modulated calm alert state is not a candidate for initiating or continuing feeding.

**FACILITATING COMPETENCE AND CONFIDENCE OF PARENTS WITH FEEDING**

The importance of the feeding relationship and the newborn’s positive experience may get lost in the “numbers” when the focus is on intake and how to empty the bottle. To support neuroprotection and parent–infant attachment, early conversations with parents about future oral feeding should focus on how complex learning to feed is for a preemie, how important positive feeding experiences are for lifelong joy in eating, and that intake is the by-product of quality feedings. Depending on the culture of feeding in each NICU, this may or may not happen, or may happen inconsistently. Parents develop their internal working model about feeding and develop their skills by watching professional caregivers in the NICU. Providing parents with the skills to co-regulate with their newborn during feeding, as contrasted with showing them how to empty the bottle, is more likely to support improved neurodevelopmental and feeding outcomes. Research has shown that if neonatal cues are misinterpreted, mothers may respond with maladaptive feeding strategies (such as pushing the nipple in the newborn’s mouth or jiggling the nipple) rather than adaptive strategies (such as slowing the feeding so the neonate can catch up). Mothers may mistakenly misinterpret the newborn’s gulping, “dribbling,” and noises during feeding to mean the neonate is very hungry or “greedy.” They may not realize that these behaviors may signal a threat to the newborn’s airway as milk pools at the back of the newborn’s throat. Without guidance, the mother may continue the feeding without making any adjustments, compromising her newborn’s airway, as aberrant respiratory-swallowing coupling may favor aspiration.

Feeding a preterm or sick term neonate is not an easy task, even for professional caregivers. For parents, whose framework is the healthy newborn, it can be both fear-provoking and disheartening, as they may observe their newborn struggle to feed, even cough, choke, or change color. Parents often evaluate their own competency as parents by their ability to feed their newborn, and they may experience feelings of inadequacy when it comes to feeding.
The parents’ experiences in the NICU may either constrain or support the emergence of their ability to safely and confidently feed their preterm neonate both in the NICU and once they go home.

Professional caregivers in the NICU can successfully utilize a process known as anticipatory guidance to teach parents to identify and use neonatal cues as a guide during feeding. Parents “learn along” with the professional NICU caregiver, who begins this teaching process at the first bottle-feeding. Parents actively observe while the professional caregiver interprets neonatal cues, problem-solves potential reasons for the behavior, and then explores interventions.

In this guided problem-solving context, parents learn about interventions that support safety and success and how to titrate these interventions based on the neonate’s responses, prior to feeding their preterm neonate. In the next phase of teaching parents, the parent feeds with guidance. The professional caregiver provides guided participation, or coaching, to reinforce offering of contingent interventions and to problem-solve alternatives. Learning to listen to their newborn during feeding from moment to moment and knowing when the newborn needs support builds competence and confidence. This dialogue or “conversation” during feeding becomes the basis for co-regulation between parent and neonate and a trusting relationship.

Each neonate’s health care team can provide a common and consistent feeding approach for professional caregivers and parents alike by creating bedside feeding care plans. These plans then act as a guide to the newborn’s typical communicative cues during feeding and what is currently working best to support the newborn’s emerging competence and safety. Having a feeding care plan to which all caregivers refer reduces variation. Using different nipples, feeding positions, or varying co-regulatory effort interfere with learning to feed. Alternatively, consistency allows for predictability and building of skill and avoids the need for the neonate to “start over” in the learning process with each feeding attempt.

CONCLUSION

Oral feeding can be a stressful experience for the vulnerable preterm neonate, because of the neonate’s neurodevelopmental immaturity. Support of emerging feeding skill and protection from stress during feeding may have significant implications for safety and long-term feeding outcomes. The underpinnings for these desired outcomes are best supported in a neuroprotective feeding environment while using an infant-guided co-regulated approach to feeding. When the neonate’s communication is understood, respected, and responded to every moment of every day, through contingent interventions, we mitigate toxic stress in the NICU and provide the relationship-based care that supports a journey toward lifelong joy in eating.

REFERENCES


DISCLOSURES

Catherine Shaker is the owner of and a paid presenter for Pediatric Resources Inc., an American Speech-Language-Hearing Association continuing education provider, which offers seminars related to article content. She receives a salary from Florida Hospital.


