The Need

A majority of infants that are cared for in the neonatal intensive care unit (NICU) are born pre-term and have several medical complications. Per the recommendation of the American Academy of Pediatrics, in order for these infants to be discharged home, they should establish safe and efficient feeding skills and demonstrate weight gain. Research shows that infants begin to develop non-nutritive suck (NNS) skills in utero as early as 12-14 weeks and that this vital function continues to develop and mature as gestational age advances. When born premature, development of this essential prefeeding skill is interrupted when the infant is forced to develop other needed life functional skills.

Non-nutritive suck (NNS) is an essential skill because it is an infant’s ‘tool’ for self-calming and sensory regulation for physiologic stability. Additionally, NNS is the building block for development of the oral motor skill set necessary for nutritive suck (NS) and independent oral feeding. Studies show that the inability to establish NNS results in delayed development of an organized nutritive suck which is essential for oral feeding success. Disorganized oral motor skills are typically the primary reason for a prolonged reliance on tube feedings and an extended hospital stay. These challenges impact patient safety and increase healthcare costs.

Willow Creek Women’s Hospital (WCWH) is located in Johnson, Arkansas and has the largest Level III NICU in northwest Arkansas with 24 beds. In 2011, the NICU unit level of service was raised by purchasing and integrating the NTrainer System by Innara Health®. The NTrainer System provides the ability to assess NNS and deliver a therapy to pre-term infants to develop NNS skills which results in a faster transition to oral feeding, weight gain, reduced length of stay (LOS), and reduced cost.

At WCWH, a team approach involving neonatologists, neonatal nurses, and therapists has been proven effective to assist infants in achieving successful oral feeding. Traditionally, the process of assessing an infant’s feeding ability has rested on the bedside neonatal nurse. These assessments can be subjective in nature and vary depending on clinician knowledge, skill level, and experience and the patient’s condition. What the NICU team sought at WCWH was an objective assessment tool that would help predict the infant’s optimal time to introduce oral feeding as well as provide supportive oral-motor facilitation.

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1 Effect of oral stimulus frequency spectra on the development of NNS in pre-term infants, Journal of Neonatal Nursing, August 2014
The Presentation to Staff

In 2011, a representative from Innara Health spent 3 days at WCWH to introduce the NTrainer System to the medical team and train the staff on the use of the system. Everyone was accepting of the tool and those trained found it to be very user friendly. Since then, the primary user of the NTrainer has become the speech pathologist. By incorporating the NTrainer System into the speech pathologist role, the therapy team now receives referrals at 29-30 weeks gestation, assuming the patient is medically stable, compared to 33-35 weeks. This practice has helped to provide a sufficient amount of time for the infant to establish organized NNS skills before oral feedings are introduced.

The Presentation to Infants

Adhering to the guidelines of developmentally supportive care is important to the therapist while using the NTrainer System. Before and during each NTrainer assessment or therapy, the infant is positioned either upright in midline or side lying with midline orientation using developmental aids. The infant’s state regulation and physiologic stability are monitored during the entire time and if the infant has a change in status and demonstrates signs of fatigue or stress, the NTrainer session is paused or stopped.

At WCWH, the NTrainer has been proven ‘gentle’ enough to be used on pre-terms as early as 29-30 weeks gestation, depending on the infant. The hand piece of the device will equip two sizes of the Soothie® Pacifier (regular and preemie models). At WCWH, the NTrainer System is now in use as a ‘standard of care’ at ~31 weeks. The SLP performs incremental assessments as needed to monitor progress and therapy is provided to each eligible infant 3 to 5x per week. Once oral feeds have been started, therapy is tapered off. The NTrainer therapy has also been used with great success just prior to a breastfeeding attempt as a way to provide a ‘suck stimulus’ and increase the infant’s level of alertness so they are more focused.

Populations other than prematurity that have used the NTrainer at WCWH include infants with Down Syndrome or other chromosomal abnormalities with developmental delay, infants of diabetic mothers, intrauterine growth retardation, neonatal abstinence syndrome, and hypoxic ischemic encephalopathy. Although the preterm population shows the most consistent results, the other infant populations respond positively and reap the same benefit of a more organized NNS pattern.

The NTrainer System is also deemed easy enough to allow professionally supervised parents to comfortably and safely use the device on their own infant. After a few hands-on sessions with the therapist, parents can be active participants in their infant’s care beginning as early as 29-30 weeks gestation. This allows parents the opportunity to observe the progression of their infant’s development from early on and learn the importance of using developmentally supportive care. Parents who are active participants and educated early on establish confidence and feel more bonded to their infant. Furthermore, it is observed that supported infants typically have better outcomes.

Benefits

The NTrainer System provides an objective assessment about maturity or organization of NNS with a graphic interpretation of the NNS pattern. This helps clinicians make informed decisions about when to introduce oral feedings and avoids the costly setbacks that may occur if feeding attempts are made too soon. Again, prior to the introduction of the NTrainer System at WCWH,
the bedside nurse would provide a subjective assessment. This often resulted in inconsistent diagnosis of feeding readiness and an inconsistent feeding practice. With the NTrainer System, there is now objective, and quantitative data to facilitate a consistent approach. As a result, the unit has established an Oral-Motor Facilitation Protocol and an Infant Driven Feeding Policy based on the Infant Developmental Feeding Scale™ by Ludwig and Waitzman.2

Speech pathologists provide good oral-motor facilitation, but the therapy mode of the NTrainer System also provides a consistent and predictable stimulus to the infant that results in more efficient ‘learning’. According to Janna Elsik, speech pathologist at WCWH, “You can see it in their eyes that the babies are waiting and anticipating the pulse, that next stimulus.” Furthermore, based on her clinical observations, the infants adapt to the stimulus quickly and tend to oxygenate better and maintain or improve their overall physiologic stability.

When asked to summarize their experience with the NTrainer, two NICU team members offered,

“*It’s* user friendly and provides a gentle predictable stimulus for the babies. NTrainer is a safe and easily tolerable oral-motor intervention that can be trialed at early gestational ages. Our unit recently implemented infant driven feeding along with the established use of the NTrainer. With the implementation of these two tools, we are observing that the babies are demonstrating readiness cues at earlier gestational ages along with organized NNS patterns that allow for earlier introduction and transition to oral feedings."

- Janna Elsik, Speech Language Pathologist

“This machine gives us an objective assessment tool. It really helps facilitate transitioning from tube to oral feeding. My belief is that it offer not only short-term benefits but long-term benefits as well.”

- Dr. Bo Lin, Chief Neonatologist

**Results**

Since its inception into the NICU at WCWH in 2011, the NTrainer System has become a necessary and valuable tool. Parents, NICU staff, and payment providers all want a timely discharge. At WCWH, one NTrainer System accommodates 10-12 infants daily with an average therapy intervention rate of 3-5 sessions per week. A second NTrainer System could accommodate more infants and provide more therapy sessions each day and augment the workload demands of the speech pathologist. Although concrete data are currently being evaluated, the effect of the NTrainer System on length of hospital stay at WCWH appears to be a reduction, on average, of 1 week.

The WCWH NICU team has been progressive about adopting new technologies and ideas when they can see the benefits. For WCWH, the NTrainer System has demonstrated the ability to meet this challenge with clinical and financial value. In addition, the support of WCWH’s hospital administration for the NTrainer System has helped move the hospital forward in providing excellent patient care in this fragile population.

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2 Changing Feeding Documentation to Reflect Infant-Driven Feeding Practice, Newborn and Infant Nursing Review, September 2007