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The Role of the Speech Language Pathologist in the Neonatal Intensive Care Unit

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THE ROLE OF THE SPEECH LANGUAGE PATHOLOGIST IN THE NEONATAL
INTENSIVE CARE UNIT

by

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B.S., Southern Illinois University, 2011

A Research Paper
Submitted in Partial Fulfillment of the Requirements for the
Master of Science.

Department of Communication Disorders and Sciences
in the Graduate School
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Introduction

The speech language pathologist (SLP) is relatively new to the neonatal intensive care unit (NICU), therefore, many do not know the roles of the SLP within the NICU. The SLP's roles have also evolved; they include feeding and swallowing with these fragile infants, as well as, providing continuing care information and education for parents and caregivers. It seems as though, when an SLP is mentioned in a NICU many individuals question what the therapist can do within the setting. This may be due in part to the lack of awareness society appears to have about the profession in general.

Although the patients in the NICU cannot speak, the SLP is still an integral part of the NICU team. The focus of this paper is to inform the average person of the SLP's roles in the NICU, and the way the therapist can influence an infant's later development. This will be accomplished through the discussion of the SLP's roles such as administering appropriate developmental assessments and interventions, understanding the infant's signals of communication, manipulating the NICU environment, feeding and swallowing interventions, promoting attachment between infant and caregiver, and educating caregivers.

Diagnostics

There are two risk categories that generally yield their presence in the NICU: established risk children, and at risk children. Children in the established risk category are those who have a known, or expected, "pattern of developmental delay accompanying whatever places them in the established-risk grouping" (Rossetti, 2001, p. 3). The established risk category includes children with whom developmental delay is

expected because of an underlying syndrome, disorder, or malformation. Children born with Down syndrome, cerebral palsy, cleft palate, Tay-Sachs disease, hearing loss, autism, toxic (drug) exposure, cystic fibrosis, or infectious diseases fall into the established risk categories. Infants born in the at risk category are not given a diagnosis, however, circumstances are presented that will affect the way children will be able to interact with their environment. Generally, children must meet four or more risk factors that qualify them at risk for substantial delay. Some risk factors include: caregiver with drug or alcohol dependence; caregiver with severe or chronic illness; adolescent mother; lack of stable residence, homelessness, or dangerous living conditions; limited prenatal care; very low birth weight; and small for gestational age (Rossetti, 2001, p.3-6). Once placed in either an established or at risk category, the infant undergoes further evaluation and intervention begins.

Although SLPs in the NICU may not provide the diagnosis for these children, SLPs will surely interact, evaluate, and provide intervention for these infants. SLPs are responsible for assessing prelinguistic and sociocommunication interactions within the NICU (American Speech Language Hearing Association [ASHA], 2005). All children, even newborn infants, have developmental expectations they should meet in order to provide evidence of healthy, normal development. SLPs may administer behavioral neurodevelopmental assessments, although these require additional training and certification. Assessments given include: *Naturalistic Observation of Newborn Behavior (Preterm and Fullterm)*, *Assessment of Preterm Infant Behavior*, *Neonatal Behavioral Assessment Scale*, *The Neonatal Neurological Examination*, and *The Neurological Assessment of the Preterm and Full-Term Newborn Infant* (ASHA, 2005). These

examinations should not be based on chronological age but gestational or adjusted age instead (description to calculate adjusted age will be described later). The assessments were developed to monitor whether or not an infant may present with a delay. Lack of meeting appropriate developmental milestones may be a precursor to delays in the future (ASHA, 2005). SLPs administer these assessments in order to implement intervention immediately.

SLPs in the NICU can work with the infant to facilitate social, interactive communication in order to enhance the infant's developmental outcomes and prevent future difficulty. SLPs work directly with the newborn, and indirectly with the family in order to provide education. According to the American Speech-Language-Hearing Association (ASHA) it is difficult to recognize any one intervention as effective because most studies have included multiple interventions. "There is evidence of some overall benefit of developmental care interventions, and no major harmful effects reported" (ASHA, 2005, p. 4). Intervention approaches include: vestibular, auditory, visual, and/or tactile intervention; clustering of care activities so more time is allotted for sleeping; positioning or swaddling for the preterm infant; and nipple feeding. These interventions allow for an enhanced stimulation experience which ultimately helps the infant experience and interact with his or her environment.

Behavioral Responses and Infant States

Understanding infant states, arousal, and behavioral responses is imperative for SLPs in the NICU. The SLP must be able to know the infant's state in order to determine if therapy and interaction is appropriate (Rossetti, 2001).

The behavioral responses infants show are stress and defense behaviors, and self-regulatory and approach behaviors (Rossetti, 2001, p. 195). Infants under stress will show autonomic and visceral signs which include hiccupping and yawning; motoric stress signals that may be motoric flaccidity, motoric hypertonicity, and/or frantic, diffuse activity; state related stress signals appear as eye floating, or strained fussiness or crying (Rossetti, 2001, p.195). When showing self-regulatory and approach behaviors the autonomic stability signals are smooth respiration, and pink, stable color; motoric stability signals are smooth, well-modulated posture, and well-regulated tone; state stability and attentional regulation signals are clear, robust sleep states, and reliable consolability (Rossetti, 2001, p.195). The SLP must understand these states to recognize the time when feeding therapy is appropriate and when opportunities for attachment and environmental interaction to expand socio-communicative skills are the most beneficial. These states allow infants to communicate their needs and preparedness (Rossetti, 2001, p.194). Not only is it important for the SLP to be able to identify these behavioral responses, but it is important that the SLP educate caregivers regarding these signals. Being able to appropriately identify infant's needs can be an initial, successful communication opportunity between caregiver and child.

Infants also display states signifying their preparedness to interact with their environment. Differences in states exist between a healthy child and those who are medically fragile. Although states between the two types of infants differ these states are not limited to one group or the other. Any child with prolonged health issues may display these states. There are three states the medically fragile infant passes through. These states are in-turned, coming out, and reciprocity (Rossetti, 2001, p.109). During

the in-turned state the infant is focused solely on his or her medical stability, and therefore, has little energy to focus on his or her surrounding environment. Infants within the NICU usually have some sort of illness, and in response, often pass through this state first in order to maintain life (Rossetti, 2001, p.110). The next state is coming out. During this state infants have their first opportunity to begin interactions with their environment. It is at this time the SLP within the NICU has the chance to observe how the preterm infant interacts with caregivers and their environment. Although this state may be one of the first opportunities the infant has to bond with the caregiver a great deal of caution should be taken into account. The possibility of the infant slipping back into the in-turned state still exists (Rossetti, 2001, p.110-111). The final state the medically fragile infant passes through is reciprocity. Reciprocity occurs when the infant is in a more stable medical condition. The state begins when the infant can effectively breathe without supplemental support and feeding has improved. "Behaviors that may be observed include smiling, vocalizing, and varying patterns of interaction with caregivers" (Rossetti, 2001, p.111). Generally, assessments should be given when an infant appropriately demonstrates the state of reciprocity (Rossetti, 2001, p.111). If a pattern of transition between these states does not occur it is important the NICU SLP report this observation, as this could be a strong indication of poor communication skills (Rossetti, 2001, p.111).

In addition to thoroughly understanding the states of ill infants, the SLP also needs to understand the states of healthy newborns. As infants improve medically they will exhibit these states as well. Healthy infants display two types of sleep states: deep sleep and light sleep. Deep sleep is characterized "with regular breathing, no activity, no

eye movement” (Rossetti, 2001, p.108), while light sleep characteristics include “rapid eye movements, random eye movements, sucking movements off and on” (Rossetti, 2001, p.108). The healthy infant also shows four different awake states: drowsy, alert, eyes open, and crying. Characteristics of drowsy infants may involve their eyes being open or closed with generally fluid movements, and mild startling. Infants who are alert can focus attention on objects and have minimal motor activity. The eyes open state is when children have a high activity level with considerable motor movement, and usually startles easily. Finally, infants who are in a crying state are intensely crying and difficult to work with no matter the stimuli presented (Rossetti, 2001, p.108).

Correcting Age for the Premature Infant

It is inappropriate to compare a healthy, full term infant with a premature infant who is at risk for communication delays and learning disabilities. An infant born at 40 weeks who has had more time to develop in a protected environment, cannot be compared an infant born at 32 weeks when so many vital mechanisms have not yet fully developed. Correction for prematurity is necessary because the infant born a lower gestational age cannot exhibit the same characteristics as a full term newborn when both are the same chronological age (Rossetti, 2001, p.112). It is the SLP’s responsibility to understand the importance of the adjusted age for the premature infant, how to correct for prematurity, and how long to continue the correction.

The importance of correction has already been mentioned. The next step is understanding how to correct for prematurity. A normal pregnancy lasts 37-40 weeks, therefore, all prematurity corrections are taken from 40. Step 1: 40 – week of gestation

infant was born = # of weeks premature; step 2: how old the infant is now in weeks – # of weeks premature = adjusted age. For example, if the infant was born during the 32nd week of pregnancy and is now 3 months (12 weeks) the formula would be as follows: step 1: $40 - 32 = 8$ weeks premature; step 2: $12 - 8 = 4$ weeks (1 month) (“Corrected age for preemies,” 2012). The infant’s adjusted age is 1 month. Therefore, this child would not be compared to other babies who are 3 months chronological age, the infant would be compared to the milestones of healthy newborns at 1 month chronological age.

Although the child may be receiving services from another SLP by the time age correction is no longer necessary, the NICU SLP should be aware when the correction should cease. In a study by Siegel conclusions revealed that “the use of correction for degree of prematurity may be appropriate in the early months, but after one year of age, there were no significant differences between the predictive ability of the corrected and uncorrected scores” (as cited in Rossetti, 2001, p.113). This study, however, was conducted before infants at a lower gestational age were surviving. Now that newborns have a better chance of survival the question has transformed suggesting that it may be appropriate to extend age correction past one year. Although research is lacking it can be justified age correction can occur up to 18-20 months for infants born at a lower gestational age (Rossetti, 2001, p.113).

Adapting the NICU environment

The SLP needs to be aware of the variety of types of stimulation within the NICU and how these types of stimulation can affect the premature infant. Touch/handling, noise, and lighting are all forms of stimulation that can cause stress for the infant, foster

opportunities for attachment, and determine potential learning disabilities as the infant grows. Each of these types of stimulation has the ability to be manipulated in order to provide the best environment for the growing newborn.

NICU babies are often exposed to high levels of fluorescent lighting, usually spanning a full 24 hours. Recently however, studies have shown potential for increasing risk of significant eye disease under these conditions (Rossetti, 2001, p.184). Premature infants who were exposed to high levels of lighting were compared to a group in which lighting levels were reduced. The infants under high lighting had a 30% greater incidence of developing retinopathy of prematurity (ROP) in infants weighing less than 1,000g, with a greater chance of developing ROP within the entire sample (Rossetti, 2001, p.184). Due to results such as these, NICUs have become more aware of significant effects on newborns caused by light. The SLP can help to alter the environment by suggesting dimming lights on a regular schedule. By adjusting lights to mirror sleep-wake cycles a more normal day-night cycle is encouraged, and newborns are provided time away from harsh lights. If lights cannot be dimmed, covering incubators with a blanket is an alternative strategy. Using indirect lighting when light is needed can also reduce stressors, along with keeping infants out of direct sunlight. Periods of darkness are also important for the infant. (Rossetti, 2001, p.184). Adaptations within the NICU environment are important to reduce potential eye conditions, as well as, reduce unnecessary stressors caused by light.

Noise levels in the NICU can also cause distress in infants. Noise levels within a NICU tend to be higher than regular nurseries and have a different quality when compared to the home environment. Staff noise has been observed to be one of the

leading contributions to NICU noise levels. Other noise sources are from machines used within the NICU including: “phones, monitors, computers, printers, portable respiratory equipment, and the flow of people in and out of the NICU” (Rossetti, 2001, p.185). Research suggests infants within the NICU “have a much higher incidence of moderate to profound hearing loss (2.5% to 5%) than infants in the general population (1%)” (Rossetti, 2001, p.185). Increased amounts of state changes have also been observed in infants within the NICU. Five infants were once observed to undergo 27 state changes within 2 hours of observation, and additional observations revealed physiological distress, characterized by increased heart rate, more than 75% of the time in response to noise (Rossetti, 2001, p.185). The SLP can provide strategies in order to reduce excess NICU noise. Some of these strategies involve moving certain types of equipment, such as printers, outside of the nursery. Other adaptations include promoting staff to quickly silence alarms, turn off audible heart rate monitors, reduce talking across rooms and over incubators, avoid finger tapping on incubators, and encourage staff to be as quiet as possible (Rossetti, 2001, p.185).

The idea of touch has continually changed over time when determining what is best for a preterm infant. Touch within the NICU should be directed towards the caregivers to promote a more nurturative touch. Studies have shown that touch that does not stimulate reflexes is more tolerable and can be used a therapeutic technique with the preterm infant. Older more mature infants were able to tolerate touch with less physiologic changes, and signs of stress were easier to identify from behavioral movements in this group (as cited in Rossetti, 2001, p.189). The SLP is responsible for teaching less distressing types of touch to caregivers, along with the proper education

regarding infant signs of stress which are described earlier in this paper. It is also important for the SLP to understand and educate caregivers of appropriate calming techniques as another method of touch. These techniques are positioning, swaddling, and nonnutritive sucking (Rossetti, 2001, p.190). When positioning a preterm infant, a prone position, rather than supine, may prove to be a better choice. Premature infants are usually born with reduced muscle tone, therefore, positioning the infant on his or her side supports the development of flexor tone (Rossetti, 2001, p.190). Although swaddling has been used for years, adopting the method to be used for preterm infants promotes better organization, increased oxygenation, and reduced heart rate. Preterm infants generally are more prone to overstimulation, and swaddling provides a solution to calm the infant (Rossetti, 2001, p. 190). Finally, nonnutritive sucking, which has been used for many years and includes sucking on fingers, pacifiers, etc., “affects sleep, state regulation and arousal, oxygenation, nutrition, and growth” (Rossetti, 2001, p.190). The SLP can also suggest the use of kangaroo care. Kangaroo care is skin-to-skin contact between infants and their parents where the child is wrapped to the parent’s chest for about 30 minutes a day. “Kangaroo care has been associated with decreased hospital stay, shorter periods on assisted ventilation, as well as increased states of alertness” (Rossetti, 2001, p.191). The method also promotes socio-communicative development, and bonding between parent and child. Medically stable infants usually tolerate kangaroo care with less physiologic changes, therefore, this type of contact can be beneficial for infants soon transitioning from the NICU. The method has shown to help regulate breathing in these infants and enhance sleep quality (Rossetti, 2001, p.191).

Feeding and Swallowing in the NICU

In order to feed orally, the infant must be able to maintain a respiratory rate of 40-60 breaths per minute, and be able to maintain a consistent suck, swallow, breathe pattern. This maneuver must demonstrate adequate protection of the airway, and the infant should show no signs of distress. There are many differences between full term infants and infants born prematurely that may contribute to feeding and swallowing difficulties in preterm infants. Premature infants may not be able to produce enough surfactant to develop the alveoli in the lungs. Infants are only capable of breathing air by 26-29 weeks and may not be able to control rhythmic breathing or regulate body temperature before this point (Delany & Arvedson, 2008). Unless there are anatomical abnormalities, dysphagia in preterm infants is often due to immature coordination (Goldfield et al., 2010). Full term infants can synchronize and stabilize their breathing patterns more efficiently than preterm infants. Goldfield (2007) used a coupled oscillator with premature infants and observed that “as breathing phases increased as coordination and strength decreased, indicating that coordination between chest and abdomen rhythms is weaker in the preterm infants” (p. 25). Oral feeding should not be introduced before 34 weeks gestation because these infants tend to demonstrate inadequate suck, swallow, breathe patterns. Premature infants tend to display disorganization making the ability to oral feed more difficult (Delany et al., 2008). These issues require the need for evaluation, as well as the help of specialized professions.

As a result, SLPs in the NICU conduct evaluations of infant swallows to determine the safety and coordination of the swallow if trouble is suspected. The SLP has the ability to assess a swallow clinically at bedside, or by using instrumental means

including: videofluoroscopic swallow study (VFSS), or flexible endoscopic evaluation of swallowing (FEES). The VFSS is administered by an SLP and provides visualization of the oral, pharyngeal, laryngeal, and upper esophagus structures. The exam's primary focus is on the pharyngeal physiology used for swallowing. The FEES is administered by an SLP, but requires extensive training on the use of the instrument. The FEES does not provide visualization of the oral phase, however, does show the tongue base, soft palate, pharyngeal, and laryngeal structures (Delany et al., 2008). Each instrument is sufficient for swallowing evaluations of preterm infants in the NICU.

Oral feeding is always the preferred method for nutrition, however, the week of gestation in which the premature infant is born can ultimately determine how the newborn will eat for the first few weeks. Infants born before 34 weeks should not feed orally due to immature and difficulty maintaining organization during suck, swallow, breathe patterns. Therefore, the SLP must be aware of other methods used to keep premature infants nourished. Although the SLP is not the medical individual that decides which type of supplemental feeding should be used, the SLP should know and understand the four types of enteral feeding available for premature infants: gastric tubes (orogastric and nasogastric), gastrostomy tube, or transpyloric tube. Maggio, Costa, Zeeca, and Giordan (2012) described three of these four types of tube feedings and the advantages and disadvantages of each. Which type of enteral feeding is best continues to be studied. There are two types of gastric tubes: orogastric (OG) and nasogastric (NG). NG tubes are placed through the infant's nose and into the stomach, while OG tubes are passed through the infant's mouth into the stomach. An advantage of gastric tubes is that neither requires an incision. However, properly placing a gastric

tube within the body of the infant's stomach has proven to be difficult. To date the most accurate way to place a gastric tube is with the use of radiographs; individuals have attempted to measure using reference marks on infants or through specific vital signs, however, all show limited reliability (Maggio et al., 2012). Another method is the transpyloric tube feeding. The transpyloric tube requires the tube to be placed in the newborn's upper small bowel, and requires the tube to be placed accurately with imaging. An advantage of the transpyloric tube is that it allows for the nutrients to be delivered to the main site of absorption and potentially reduces esophageal reflux and risks of aspiration. However, the disadvantage to this type of tube feeding is the complete bypass of the gastric phase, potentially allowing pathogenic organisms into the upper bowel which could have been removed by the stomach acid, "and secretion of upper intestinal hormones and growth factors may be impaired" (Maggio et al., 2012, p. S32). Research has not shown this type of enteral feeding to be more effective with infant growth rates and revealed a greater incidence of gastrointestinal disturbance (Maggio et al., 2012). A gastrostomy tube (g-tube) is also a viable option for premature infants needing enteral feeding. A g-tube is placed through an incision into the infant's stomach. G-tubes are able to remain in the infant for long periods of time, and can therefore be used for infants who may have underlying conditions which could delay oral feeding (Bird, 2009). The therapist should understand how these tubes work, as many patients on the SLP's caseload may be using these types of enteral feeding, and recognize these feeding moments as an appropriate time to conduct therapy involving exercises along with non-nutritive sucking or oral motor interventions.

SLPs in the NICU must also determine appropriate swallowing interventions. Common intervention strategies involve teaching the preterm infant non-nutritive sucking (NNS) and oral motor interventions (OMI). An evidence-based systematic review (EBSR) addressing the effects of oral motor interventions attempted to determine which methods proved most effective in infants (Arvedson, Clark, Lazarus, Schooling, & Frymark, 2010). The EBSR indicated NNS positively affected changes of the swallowing physiology and reduced the amount of time needed to reach total oral feeding. The use of OMIs alone found ambiguous results neither supporting nor refuting the use of OMIs for swallowing treatment alone. The use of NNS combined with OMIs showed similar effects to the use of NNS alone. Ultimately, more research is needed on the topic in order to determine the best intervention method for preterm infant swallowing. The SLP in the NICU must make the decision regarding which intervention method is most appropriate. The SLP should conduct research to determine which intervention may provide a better outcome on an individual case basis. SLPs in the NICU provide the necessary skills an infant will need to sustain a healthy, effective swallow throughout life (Arvedson et al., 2010).

Even after premature infants begin to feed orally their oral musculature may need to be shaped to improve the effectiveness and efficiency of infants' motor skills for feeding (Overland, 2010). Premature infants sometimes display difficulty with tongue cupping and lateralization when learning to feed orally (Overland, 2010). SLPs within the NICU must be aware of helpful exercises to assist the infant when learning these important feeding patterns. When helping an infant learn tongue cupping a suggested exercise is to push down on the tongue about one quarter to one half of the way into the

oral cavity (Overland, 2010). This can be done with a gloved finger, pacifier, or bottle during feeding (Overland, 2010). When teaching an infant to maintain tongue lateralization an adequate exercise is to stroke the tongue from back to front with a gloved finger (Overland, 2010). The SLP and/or caregiver can also stroke the infant's cupid's bow with a bottle or pacifier before feeding or before giving the pacifier to the infant (L. Thompson, personal communication, November 15, 2012). Due to common disorganization among premature infants these exercises provide a way to teach appropriate motor skills for safe and effective oral feeding.

After infants have undergone appropriate interventions to facilitate oral feeding other dangerous aspects must still be monitored. When feeding, infants show signs of distress when having difficulty (Thoyre & Carlson, 2003). It is crucial the SLP know and recognize these signs, as well as inform caregivers to monitor and respond to these signals. Signs of distress may include finger splay, arching, flaccidity, eye flutter, cyanosis, and eyebrow raising (Thoyre et al., 2003). When observing any of these behaviors the caregiver should cease feeding, if only temporarily, and allow for self-regulation or personally address infants' needs. This can be done by providing infants with cues to breathe by changing positions or "tipping the bottle back to stop milk flow" (Thoyre et al., 2003). Newborns may also pull away from the bottle or the nipple when trying to self regulate breathing. It is important to identify when infants are doing this as many new caregivers can misconstrue this behavior as indication they are full (Thoyre et al., 2003). Preterm infants attempting to self regulate breathing while feeding often endure episodes of oxygen desaturation. Infants who have more oxygen desaturation events tend to experience longer transitions to full oral feeding (Thoyre et al., 2003).

Recurrent oxygen desaturation events can have a negative impact on development and cognitive pathology (Thoyre et al., 2003). Consequently, adequate oxygenation is also the basis for coordinating the suck, swallow, breathe pattern, as well as, maintaining endurance, tone, and oral-motor control when feeding. Ultimately, adequate oxygenation allows infants to maintain organization and provides the energy to appropriately and safely feed (Thoyre et al., 2003). SLPs in the NICU need to know that both full term and preterm infants undergo two phases when feeding: a continuous phase, and an intermittent phase (Thoyre et al., 2003). During the continuous phase infants suck vigorously therefore obtaining a greater amount of formula but move less air per minute (Thoyre et al., 2003). Infants then pass into the intermittent phase when they regulate sucking bursts with improved respiration (Thoyre et al., 2003). Infants differ during this phase. Premature infants, as opposed to full term infants, only partially regain adequate respiration due to taking brief, shallow breaths (Thoyre et al., 2003). This in turn only allows the preterm infant to partially recover adequate oxygenation. SLPs should also be aware that preterm infants during the continuous phase may become disorganized and lose formula due to sucking beyond their ability to manage the bolus (Thoyre et al., 2003). Thoyre et al. (2003) set out to determine if specific behavioral signs indicated an oxygen decline in premature infants during bottle-feeding. Unfortunately, the investigators determined that not one specific behavioral sign was prominent when determining pre-desaturation or desaturation events. The investigators did however determine that “a breathing pause and a change in sucking” (p.639) were the most identifiable cues to an approaching desaturation event. Breathing changes and absence of sucking should be monitored closely in premature infants who are sleepy or

fatigued due to less behavioral cues of oxygen decline. The SLP must be able to identify infant signs of distress and provide intervention and education to caregivers to facilitate reorganization for the infant.

Although SLPs do not regulate the amount that preterm infants should be eating, the therapist is responsible for understanding a safe mode of delivery as well as feeding habits of newborn infants. The amount a preterm infant should be eating is based off each individual newborn, and calculated according to their needs to promote healthy growth and nutrition (Bird, 2012). Full term infants should nurse or be fed 8 to 12 times a day with less than 4 hours between feedings (Overland, 2010). At this stage infants should be fed on demand according to their needs. Full term infants generally consume up to 32 ounces of breast milk or formula a day (Overland, 2010). The SLP has a role, which may also be shared with NICU nurses, to determine if the infant is being provided the proper bottle and nipple for safe and efficient feedings. Today there are many different types of nipples. SLPs should be knowledgeable about the flow rates of various nipples. There are three different types of flow rates: slow, medium, and fast (Dowling & Tycon, 2010). Slow flow nipples are those usually recommended for premature infants in that they allow more time for organization and permitting the infants regulate their suck, swallow, breathe pattern without overwhelming them (Dowling et al., 2010; Shaker, 2013). However, all infants may vary when needing to increase nipple flow rate depending on the aggressiveness of their suck, the safety of their swallow, and ability to maintain organization (Dowling et al., 2010). All newborns, premature and full term, should begin with a slow flow nipple and adjust depending on their needs (Dowling et al., 2010). "If the baby appears comfortable, stay with that nipple" (Dowling et al., 2010).

SLPs and nurses in the NICU should be able to aid caregivers in the selection of appropriate nipples.

Attachment

Attachment between infant and caregiver is difficult when the relationship is within a NICU setting. Depending on the infant's medical condition, physical contact may not be possible, changing the situation parents may have anticipated during pregnancy. First, it is important to note the differences between mother and father's initial reaction to their newborn baby. Fegran, Helseth, and Fagermoen (2008) examined these differences between mothers and fathers with their newborn preterm infants. Mothers may experience emotional and physical trauma during the birth of their preterm infant that may delay their initial experience with the child. This in turn, may render the mother feeling helpless and reduce her confidence when interacting with the infant. Fathers, on the other hand, can immediately be brought into the NICU and encouraged to touch or hold their newborn, as long as they are in stable condition. Fathers are immediately able to interact with their child and feel a sense of protection over the preterm infant. This gives the father a positive effect when meeting their new baby (Fegran et al., 2008).

Secure attachment between an infant and caregiver has shown to greatly enrich any child's life when learning language, social behavior, and growing into a secure adult. This is why children who spend their first weeks or months of life in NICUs may be at a disadvantage when developing critical bonds that lead to later developmental experiences. Children in a NICU may have a more challenging time developing these

bonds because of medical circumstances. Sometimes, the necessary physical touch is not allowed because of the infant's fragile state. Coppola and Cassibba (2010) showed that the more serious an infant's medical condition was, the less mothers spoke to their babies. Mothers who were able to hold their babies were also prone to speak more to their children, and were less focused on monitors and machines as opposed to mothers who could only be near their children's incubators. The study also showed a mother's initial reaction to the premature birth affects the behavior while in the NICU. This early behavior (inconsistent eye gaze, restricted facial expressions, and limited verbalizations) may be an important indicator for the quality of interaction expected later with the infant.

Since these early interactions with the infants may promote future language opportunities, attachment intervention should begin as quickly as possible. Fegran et al. (2008) suggested skin to skin contact as the first step to a secure bond between parent and infant. Fathers are at an increased advantage with this opportunity because they do not have to undergo physical recovery after the birth. The skin-to-skin contact "transformed the infant from being something impersonal to becoming a child with whom they emotionally and physically identified with" (Fegran et al., 2008, p. 815). SLPs should promote as much contact as possible between infant and caregiver to encourage a secure attachment. Other studies have also indicated providing extra support during and after the first few moments of contact with infants can help develop a healthy relationship, especially when the mother reports negative first experiences (Meijssen, Wolf, van Bakel, Kolderwijn, Kok, & van Baar, 2011). Evans, Whittingham, and Boyd (2012) suggested that mothers may benefit from receiving Acceptance and

Commitment Therapy, and behavioral marital therapy in and out of the NICU. It is especially important to observe that the avoidance and reluctant behavior may indicate decreased responsiveness to their child as well as a prolonged complicated reaction (Evans et al., 2012; Fegran et al., 2008.). SLPs in the NICU should be supportive and encourage bonding moments between infant and caregiver, as well as, be observant to issues a mother may be experiencing in the feeling of competence with her newborn. When an SLP feels a mother may be having difficulty accepting her infant, referrals should be made to other supportive professions or groups. Involving parents in care-taking routines can also promote their confidence of their own parenting roles (Coppola et al., 2010) and make the parents feel more a part of the NICU team. These routines may include changes in breathing, recording of sleep routines, etc.

The SLP and the Family

While in the NICU, as well as after NICU graduation, the SLP needs to provide caregiver education and counseling. The time spent in the NICU can be a traumatic experience for the infant, as well as the family. The family should be well informed in regards to developmental expectations, communication interaction patterns, and feeding and swallowing behaviors. The family should be a part of the NICU team by engaging in routine behaviors and contribute to a supportive and nurturing environment to facilitate development (ASHA, 2005).

SLPs can also suggest intervention for the caregiver. Parent support groups are usually provided within the NICU and can be led by hospital staff, mental health professionals, or other parents. Scott and Doyle (1985) provided a model for “a one-to-

one match between new parents and trained parents who have a disabled or at-risk child at home” (as cited in Rossetti, 2001, p. 72). These interventions should be implemented as soon as possible. The family is able to associate with other families who have undergone similar experiences and allows for support, and discussion of multiple issues. Although research is still needed in this area studies have been conducted on the efficacy of support groups and suggests promising results.

Additionally, educating the family, especially mothers, about their newborn’s abilities may facilitate earlier attachment, and can lead to earlier interaction and participation in intervention. For these reasons it is extremely important for the SLP to build a relationship with the families in the NICU. Facilitating family participation helps to ensure an environment where the infant is set up for success. By continually being engaged, caregivers feel a sense of involvement in taking care of their infant, and feel more secure about their ability to care for the baby after he or she is able to leave the NICU.

SLPs must also consult with the family in regards to discharge and transition planning. Services in the NICU may aid the family in finding community resources and follow up care after hospitalization. Follow up care may be necessary for the NICU graduate and the evaluations that are necessary to determine the infant’s eligibility for Early Intervention can be initiated during the NICU stay (ASHA, 2005).

Conclusion

The SLP has many important roles in helping infant and caregivers develop lifelong strategies to help the NICU graduate succeed, this paper only highlights a few

of their important tasks. When these goals are met a family and infant can begin a happy, healthy, and stimulating life together. Although it is known that the SLP's presence in the NICU is important, more research is needed in every area to show the impact intervention has on these infants and their caregivers. Since speech pathology is a relatively new profession, research is limited in many areas. More research needs to be done to determine the best interventions for feeding and swallowing issues in NICU infants. Each article in the above review stated that multiple studies have reported different efficacious findings. This begs the question of which intervention method works the best, and which shows sustained improvement. The research also acknowledged the studies were preliminary studies on attachment. More research is needed in the area of interventions, specifically for mothers. These studies present the reader with questions regarding which approaches work best to facilitate successful opportunities to create secure attachments between infant and caregiver.

The SLP is one of the first interventionists in the NICU that can begin to mend negative first experiences, and create opportunities for a developmentally rich future. By providing feeding and swallowing evaluations and interventions the SLP can successfully help an infant oral feed, and establish one of the first opportunities for attachment, breast feeding. The SLP can also counsel a family through a traumatic experience, and begin to repair the initial fear experienced by the caregiver. The NICU SLP has the ability to provide the infant's first interventions which allow the newborn to begin interacting with their environment at a much younger age. The therapist is also an essential consultant for future care and family recommendations. There are no

disadvantages to the presence of the SLP in the NICU, and the therapist's versatile roles can enhance the life a newborn and their family members.

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