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OT in the Neonatal Intensive Care Unit

Introduction [1,2,3]

Between 10 and 15% of all babies born in the United States require care in the NICU. There are many reasons why a newborn might need to stay in the neonatal intensive care unit (NICU), including heart problems, birth defects, infections, breathing issues, and more. Prematurity is another common reason a newborn may end up in the NICU, since 1 in 8 babies are born before 37 weeks gestation[1]. In particular, the opioid crisis is a driving force behind the high demand for NICU services and professionals. The rate of pregnant women and new mothers living with opioid use disorder has grown by four times between 1999 and 2014. This has also led to an increase in newborns who need treatment for Neonatal Abstinence Syndrome (NAS). Figures from 2016 show that about 80 newborns are diagnosed with this condition each day.

As a result, occupational therapy professionals need more detailed information on this specialty in order to effectively and smoothly enter this practice area. With a generalist education being the industry standard for rehab professionals, occupational therapy providers may have received a high-level overview of an OT's role in the NICU. Yet, others may not know anything at all about this specialty.

This course will detail the developmental information that is necessary for therapists to know along with standard medical interventions, education to parents and other caregivers, as well as attachment and bonding concerns that are often present and can impact care.

Section 1: Neonatal Development [4,5,6,7,8,9,10,11]

In order to be an effective therapist in any pediatric setting, it is crucial to know how a child grows and functions. Babies and children of all ages need to reach certain developmental milestones at certain times to functionally engage with their environment. While therapists in pediatric settings such as schools should be familiar with milestones through adolescence, NICU providers should have a solid understanding of different markers. In particular, it's helpful to know the aspects of gestational development (when the child is still in utero) as well as milestones up through the first year of life.

A large part of development takes place while a baby is still growing in their mother. This is when the sensory systems are created and they begin to serve a purpose early on in the gestational period.

Weeks 1 through 4

At this point, a fetus will begin to form a basic face with large dark spots for eyes. They will also develop a small heart tube that beats by the end of the first month of pregnancy. A rudimentary mouth, jaw, and throat will surface to assist with feeding through the mother's placenta.

Weeks 5 through 8

A fetus will now begin to grow small skin folds that will eventually develop into functioning arms and legs. This is also when eyes, toes, and fingers become more defined in shape and size. In the area that houses the brain and spinal cord, there is now a neural tube, which will form these organs eventually in addition to the rest of the nervous system. Up until now, the fetus was mostly cartilage but bones begin to form in place of this. The digestive tract and sensory organs also begin to develop.

Due to the increased development of the brain, the head becomes the appropriate proportion to the rest of the body. In regards to sensory systems, the sense of touch is the first to emerge. Since the head and face are the most developed areas of the body, tactile receptors are most active near the lips, nose, and mouth. A primitive semicircular canal develops during this time, which gives the fetus early vestibular function. The rough shape of a nose is also present at around the fifth week but the sensory functions and structures of the nose are not in place until the eighth week. At this time, the optic nerve also develops, giving way to slightly more sensitive visual functions.

Weeks 9 through 12

By the end of this month, the fetus will be fully formed. This means it will have hands, arms, fingers, feet, and toes that it can use to explore its environment. Early teeth and nails begin to form, as do sex organs. The fetus can open and close their mouth and make a fist. This is also when the circulatory, urinary, and excretory systems begin to develop and even start to produce some bodily fluids, such as bile in the liver. At this point, all nerve endings are in place in the sensory system and can function, though this may not be immediately apparent in utero. The tactile system further develops and sensation is present on the palms and soles of the feet.

Weeks 13 through 16

During this time, the existing structures in the fetus become more well-defined, including sex organs, bones, teeth, fingers, and toes. At this point, the tactile system

also extends to include sensory receptors near the abdomen.

Weeks 17 through 20

There may not have been much fetal movement up until this point. However, during these weeks is when mothers will begin to feel more fetal activity. A fetus will begin to move their muscles around, kick, and generally exercise the new limbs that have formed. This is also when a fetus develops protective features to sustain themselves for the remainder of the pregnancy. They will grow a layer of soft, fine hair over the head and upper body as well as a temporary, slick layer over the skin. This hair and skin is shed within the last week of pregnancy or the first week of life, since it mainly serves to protect the fetus from the amniotic fluid. Up until now, the tactile system is the major sensory function of a fetus. But, at week 20, the taste buds emerge and the baby will begin to experience certain types of gustatory input.

Weeks 21 through 24

During this time, the circulatory system becomes especially active in pumping blood and other fluids throughout the fetus' body. This is also the first time the eyes begin to open, so they are using their newly-developed visual system to explore their surroundings. The auditory system is structurally and functionally complete by week 24, which is when the fetus will begin to move and respond to sounds. They may be less outwardly responsive but their reaction can be noted in the nervous system by an increased heart rate. Additionally, the vestibular system will be functional and active by week 21, so the fetus may be more sensitive to movements around them that influence their position in the uterus.

Weeks 25 through 28

Due to the significant development of many senses, the fetus will be a lot more responsive during this time. This includes changing position frequently and responding to stimuli like light, pain, and sound. In particular, 26 weeks is a formative milestone. At that time, all neurons in the visual cortex are present and there is more rapid ocular growth, so vision is more precise than in earlier weeks. Tactile reflexes (such as the rooting reflex) also emerge at that time. The fetus' sense of taste also develops and they will withdraw in response to bitter tastes.

Weeks 29 through 32

A fetus at this stage can see and hear rather well. Their brains are rapidly developing

due to the increase in sensory stimulus they are receiving. For this reason, the fetus may be kicking more than it has during other times. Aside from the lungs, most of the fetus' internal structures and body systems are well-developed. Sensory receptors have also extended to the back and the legs by this time, so that provides them with even more feedback when they kick, move their muscles, and curl or arch their backs.

Weeks 33 through 36

The fetus has developed almost entirely and has coordinated reflexes by now. They can blink, move their head, grasp firmly, and respond to light, sound, and touch. At this stage, a fetus can open their eyes almost entirely with a higher level of visual alertness. Their sense of taste has also developed more and they can now differentiate between glucose and water. This is more practical outside the womb. As early as 3 days old, a newborn can tell the difference between breast milk and formula due to their ability to discern between sour and bitter tastes. While still in the womb, they can also distinguish substances that are water-based or glucose-based to determine what has the nutrients they need.

Weeks 37 through 40

While not much more development occurs during this time, some important changes do happen. A fetus will not move as much due to limited space in their mother's uterus and abdominal cavity. The movements that are made pertain directly to their positioning, since they will often move lower into the pelvic area to prepare for childbirth.

While many NICUs officially house newborns up through 28 days old, the general consensus is that a child who still demonstrates a medical need for intensive care can remain on the unit up through their first birthday. For this reason, therapists should know a range of developmental milestones to assist them in doing their jobs.

Two months

According to the Centers for Disease Control and Prevention (CDC), two-month-old babies should show early signs of socioemotional development by smiling at others, trying to look at someone who is holding them, and attempting to soothe themselves (usually by sucking on their thumb). They will also turn their head toward sounds and begin to coo or make other incomprehensible sounds to express themselves. Their social and cognitive development often go hand-in-hand, since they are not only looking at others more often but also attending to faces for longer periods of time. They will track objects with their eyes and can usually recognize familiar people at a distance. A

two-month-old will also demonstrate boredom and get fussy if they are not engaged. Babies at this age will also be able to hold their heads up and can even begin to push their bodies up when lying on their stomachs. The movement of their limbs also becomes a bit smoother and more coordinated at this age.

Four months

At this age, a typically-developing baby will begin to babble and copy sounds they hear. Their cries will also be more defined, and parents or caregivers may be able to determine what is a “hungry cry” versus a cry that indicates pain or fatigue. A four-month-old will also be more inclined toward people, noted by spontaneously smiling at others and crying when someone stops playing with them. They may even copy some facial expressions or gestures. In terms of cognition, a baby at this age will respond to affection and outwardly express feelings of happiness or sadness. They also have improved hand-eye coordination (they can track a single object from side to side) and can begin to reach for objects around them with one hand. They also pay closer attention to faces at this age.

Babies who are four months old can hold their head up, roll over, and push up to their elbows while laying on their stomachs. They can hold toys, shake them, bring them to their mouths, and swing at items that dangle in front of them. A four-month-old will also push their legs into the ground when their feet are on a surface. This is one of the reflexes that will help a baby as they begin to walk. We will discuss reflexes in more detail later.

Reflexes

Another important aspect of a baby’s development is reflexes. Primitive reflexes are automatic reactions that are produced by the body’s central nervous system in response to certain stimuli. Infants undergo reflex testing immediately after they are born as well as every few months. This testing is to ensure that certain primitive reflexes are present, since these mean that the child is developing as expected.

Over time, a typically-developing infant will no longer demonstrate these reflexes because they are integrated as their nervous system (particularly the frontal lobe) becomes more organized. Reflexes are commonly tested in infants under the age of 3 as well as adults who have experienced a neurological injury such as a stroke or brain injury. While infants should demonstrate primitive reflexes up until a certain point, adults should not. So if a therapist observes primitive reflexes in an adult, they will

undergo reflex integration as part of therapy.

The rooting reflex assists with feeding and will be present in typically-developing infants until about 4 months of age. This reflex is elicited by stroking the corner of the infant's mouth. The desired response is the baby turning their head toward the side of the mouth that was touched and opening their mouth.

Another reflex is the Moro reflex, also known as the startle reflex, which lasts from birth until about 2 months old. The Moro reflex can be elicited by a sound that slightly scares the baby. The desired response to this sound is crying while extending their head, arms, and legs, then pulling the extremities back in.

The suck reflex is another response that assists with feeding. This reflex begins to develop while the baby is still in utero and is elicited by touching the roof of the mouth. When this occurs, the baby will begin to suck. Sucking is crucial to babies being able to feed and breathe simultaneously, so this reflex is helpful within the first few years of life. Since this skill should be mostly developed while still in utero, premature babies usually need therapy surrounding this area after they are born.

Another reflex that parents often like to test out is the grasp reflex, which lasts until around 6 months of age. When you touch the baby's palm, their fingers should flex to form a loose fist. A similar, but less common reflex exists in the toes and lasts until around the baby's first birthday.

The tonic neck reflex is a lesser known reflex among the general population, but therapists and other healthcare providers may recognize it as the fencing position. This can be elicited when the baby's head is turned to one side. The response that should occur is arm extension on the side where the head is turned and elbow flexion on the opposite arm. This will last for 5 to 7 months.

Lastly is the stepping reflex, which only lasts for around 2 months. Many parents confuse the stepping reflex for early walking. This can be elicited when the baby is held upright or their feet are touching the ground. The response that results is what looks like dancing or small steps.

Section 1: Personal Reflection

What areas of development do you think progress the most before the first year of age?

Section 1: Key Words

Primitive semicircular canal: A small structure in the ear that governs balance and equilibrium

Social development: The process where a baby learns to interact with others around them

Motor development: The process where a baby begins to develop small and large (fine and gross) motor skills, including control, coordination, and dexterity

Cognitive development: The process where a baby begins to learn early concepts such as patterns, colors, shapes, numbers, letters, and eventually more complex topics

Emotional development: The process where a baby develops attachment to others around them and learns to regulate their emotions and the behaviors that result from them

Bilateral integration: Being able to use both sides of the body equally and at the same time; also referred to as bilateral coordination

Primitive reflexes: Reflexive actions that stem from the central nervous system and result from certain stimuli; this is normal in infants of a certain age but they may present in adults who have experienced a stroke or brain injury

Section 2: Role and Scope of OT [12,13,14,15,16]

The long-term intent of occupational therapy intervention in the NICU is to reduce stressful conditions that the baby may be experiencing as a result of underdeveloped bodily systems. This can include the visual and musculoskeletal systems but particularly focuses on the nervous system and its ability to regulate and respond to sensory stimuli. The hospital can be a very overwhelming and overstimulating environment for anyone, and even more so for newborns. For this reason, sensory regulation will be key in a baby's early days.

The American Occupational Therapy Association States that a therapist's role in treating children and youth should extend to address their developmental, educational, emotional, behavioral, and injury-related needs. While some of these areas do not yet pertain to babies, injury-related needs are one of the biggest considerations that impact OT treatment in this setting. For example, it will be part of a therapist's job to address

the remediation of sensory concerns that may result in NICU babies. This also includes visual, motor, and strength issues secondary to deconditioning that may result from an extended hospital stay.

There are various categories of hospital nurseries to meet the spectrum of newborn needs. Level I nurseries are for healthy newborns without any specialized medical needs. Level II nurseries are intended for premature babies born at 32 weeks gestation or greater. Babies at this level may need to recover from certain conditions, but they do not require overly intensive services. Level III nurseries offer subspecialty newborn care for babies born at less than 32 weeks gestation. This setting is also appropriate for babies of any age who are born with critical illnesses across any medical specialty. Level III nurseries accommodate needs such as respiratory support and imaging. Level IV nurseries offer the highest level of care and are located in hospitals that can readily perform surgery on any congenital or acquired conditions that may be present. Care at this level also includes education and outreach, which is a central part of a therapist's job in this setting. To provide a range of educational and training needs, occupational therapists are typically found in level III and level IV nurseries.

According to the Family-Centered Care model that guides the roles of most healthcare providers in the NICU, intervention focuses on parental participation, parental and/or caregiver training, family empowerment, and humanized care. In particular, an occupational therapist's education and training to parents typically covers areas such as attachment and bonding, infant and caregiver mental health, stress management, age-appropriate feeding, sensory development, and grief reactions.

Parents also receive education about how to position their baby so they are comfortable and able to interact with their environment. This training also includes instruction on how parents should carry their infant without injuring themselves or the baby. Parents will work with the OT to learn about general and specific triggers that can contribute to sensory dysregulation. As part of this education, parents will also learn strategies and techniques that promote consistent regulation. A crucial part of attachment and bonding is infant massage, so parents undergo training to do this in a way that is safe, effective, and offers a deeper connection with their baby.

Section 2: Personal Reflection

How do you think an occupational therapist's role might differ across certain level nurseries?

Section 2: Key Words

Level I nursery: Standard care for full-term newborns

Level II nursery: Offers slightly more specialized care for premature babies born before 32 weeks

Level III nursery: Provides care for babies of any age with serious illnesses or those who were born before 32 weeks gestation

Level IV nursery: Offers the highest level of care for babies with critical illnesses and those who need surgical treatment for congenital or acquired health concerns

Section 3: Medical Intervention [17,18,19,20]

There are a variety of reliable and valid standardized assessments that are used to evaluate newborns in the NICU. One is the Premature Infant Pain Profile (PIPP) used to measure oxygen saturation, heart rate, and facial responses in preterm infants to gauge the level of pain they are experiencing. The PIPP can be used to measure day-to-day pain as well as pain after a procedure. Another measure of daily pain is the Neonatal Infant Pain Score, or NIPS, which looks at crying, breathing patterns, facial expression, arm and leg movements, and level of arousal to determine the severity of pain. The Neonatal Facial Coding System (NFCS) looks primarily at facial expressions as an assessment of procedural pain.

The Neonatal Pain, Agitation, and Sedation Scale (NPASS) can be used to evaluate daily pain, post-procedure pain, and pain secondary to mechanical ventilation. The NPASS looks at tone, vital signs, facial expressions, crying, and irritability. While this is an equally reliable and valid measure compared to the other tests, it does not differentiate between pain and agitation.

The CRIES scale is used to determine pain levels after a procedure. The acronym stands for cry, requires oxygen, increased vital signs, expression, and sleeplessness. Supplemental oxygen is indicated if saturation levels fall below 95%. The COMFORT scale is another rating that can be used post-operatively and in critical care situations. This measures movement, calmness, respiration, heart rate, tone, facial tension, alertness, and blood pressure.

The FLACC scale is another reliable measure that is more suitable for kids ages 2 months to 7 years and anyone else who cannot verbalize their pain levels. The acronym

identifies the areas that this scale focuses on: facial expression, legs, activity, crying, and consolability. This may not be as helpful for babies in the NICU but it can assist providers in evaluating pain in some older patients on the unit. This is scored from 0 to 10 with 0 indicating no pain.

Therapists working in hospitals should always be familiar with the normal range for a person's basic vital signs so they know how to best help their patients succeed during treatments. The ranges of vital signs are understandably quite different for infants, but it's equally as important to know, since infants tend to be much more sensitive and medically-fragile than adults.

Babies between 0 and 12 months of age should have a resting heart rate between 100 and 160 beats per minute (bpm). A baby between 0 and 6 months old will have a respiratory rate of 30 to 60 breaths per minute (bpm). This range changes slightly as a baby ages, moving to 24 to 30 bpms for a 6- to 12-month-old.

A newborn's blood pressure is also expected to be much lower. A baby between 0 and 6 months old should have systolic levels from 65 to 90 millimeters of mercury (mm/hg). Their diastolic levels should span between 45 and 65 mm/hg. Overall, this means their blood pressure levels should hover between 65/45 mm/hg and 90/65 mm/hg.

Temperature is the only vital sign that is ideal at 98.6°F for infants, children, and adults alike. However, the normal range spans 97.4 and 99.6°F. The most accurate way to measure the temperature of babies up until 3 years of age is through the rectum. This is done by inserting the thermometer into the anus. Other methods are across the forehead and in the mouth, ear, or armpit. It is important to note that the well-known value of 98.6°F refers to the oral temperature, so measurements taken from a rectal thermometer may be .5 to 1°F higher than this value.

Pain reduction is crucial in this setting. While other healthcare providers may aim to lessen bedside disruptions by timing their screenings with care procedures like diapering and suctioning, this may not always be helpful for therapists. The goal of occupational therapy in this setting is to decrease discomfort, so adding more sensory stimuli during a visit with a lot of activity is not likely to improve the baby's quality of life.

There are some pharmacological methods of pain relief, such as morphine and fentanyl, for babies with critical illness who may be experiencing severe pain. Additionally, newborns may be given local and topical anesthetics to relieve discomfort associated

with rashes or circulation issues.

Some doctors prefer to avoid heavy-duty pharmaceuticals for pain management in newborns since there are highly specific dosages and these medications can lead to adverse side effects such as withdrawal. Instead, providers often opt for sucrose and other sweeteners. These are proven to be both safe and effective at lowering pain in newborns. When sucrose is given orally, it has a similar effect in babies as prescription drugs do. Sucrose stimulates the taste receptors on the tongue, which engages the opioid system in the brain and soothes pain.

This is also when the concept of non-nutritive sucking is often introduced, as the use of a pacifier or even sucking on a finger can ease pain and provide comfort. Additionally, this type of sucking in the absence of food can assist with digestion and an improved swallow reflex.

There is a lot of evidence behind the non-pharmacological methods to relieve pain in newborns. One of the most common is kangaroo care, also known as skin-to-skin contact. This is recommended for all newborns, no matter their medical needs, since it facilitates attachment and bonding between the mother and child. This is best done when the baby is wearing only a diaper and is rested on the mother's bare chest.

Facilitated tucking is another method of pain reduction that focuses on positioning the baby in a side-lying, flexed position similar to the fetal position. This is proven to reduce pain related to suctioning and other health concerns. The reduction in pain can also serve to reduce stress, which helps encourage nervous system and motor development.

Infant massage is another soothing technique that can begin as early as one week after birth. This is a skilled way to improve bonding and attachment. Infant massage can regulate their stress hormones, improve their sleep, and reduce crying or irritability. Unlike traditional massage in adults where some discomfort may be normal, infant massage should be stopped as soon as you sense the baby is uncomfortable. Massage should only be initiated when the baby is alert, calm, and generally content. Start at the toes and use both hands to massage around them. Place both hands around the leg and work upward using medium pressure and a motion similar to turning a bottle cap. At the abdomen, massage in a clockwise circular motion to push gas down in the stomach. Massage upward at the chest and extend out to include the shoulders. Use the same circular motion on the arms as you did on the legs. Massage in a circular motion at the forehead and ears. Flip the baby on their stomach and repeat the same steps on their back side.

The NICU also has a lot of medical equipment that varies based on medical need and age. Babies usually start off in enclosed giraffe beds or more open radiant warmers. As they age, they are often moved to isolettes or incubators. Some older babies or those who are nearing discharge may even be appropriate for a modified open crib.

Babies who have lung problems or severe breathing issues may need intensive support from a mechanical ventilator if they cannot breathe on their own. This is a machine that takes over for their lungs and pumps the air into their body. This comes along with an endotracheal (ET) tube placed in their windpipe. Babies who receive mechanical ventilation will usually need to be suctioned. This removes mucus, secretions, and other materials from the airway since the baby's lungs are too weak to do so independently. Babies who only need supplemental oxygen will receive humidified air through a nasal cannula inserted slightly into the nose so it is easier for their lungs to process.

Newborns in the NICU often need medications, nutrients, or fluids provided quickly and easily. The most efficient way to do this is intravenously. This involves the insertion of a needle and a port into the head (a PIV or peripheral intravenous access) or the arm (a PICC or peripherally-inserted central catheter). Additionally, newborns may have jaundice, which impacts their ability to eliminate bilirubin from the liver. This may be treated using a bright overhead light (called phototherapy) or a bili-blanket placed directly on them.

Section 3: Personal Reflection

How might an endotracheal tube impact a newborn's ability to feed and swallow?

Section 3: Key Words

Non-nutritive sucking: Suckling without consuming nutrients, such as on a pacifier or a baby's finger

Kangaroo care: Skin-to-skin contact between baby and mother to improve bonding

Facilitated tucking: Placing a baby in a side-lying, flexed position similar to the fetal position to relieve pain

Section 4: Partnering with Parents [21,22]

Occupational therapists working in the NICU have perhaps one of the most collaborative roles. While working one-on-one with a newborn is crucial for sensory integration,

visual motor activities, and play-based interventions, educating parents is an even bigger part of the treatment plan. Babies are entirely dependent on others at this age, so the only way to ensure compliance and carryover is to train the adults involved in their care. When compared to other home programs and forms of patient education, this type is critical to a baby's development. For this reason, it's very important to ensure that parents and caregivers have all the information they need to continue care at home.

The mere presence of the parents also plays a large part in the progress that a newborn experiences as well as their stress response. Many factors may influence a newborn's reactions to their environment, but research shows that most new parents visit the NICU roughly four times each week. This means that, for the majority of their hospital stay, newborns often do not have their parents to buffer these responses to noxious stimuli from the NICU environment. While interventions such as facilitated tucking and kangaroo care can assist in lowering levels of discomfort, additional studies show these treatments are inevitably omitted by professionals due to staffing shortages or job-related constraints. This further emphasizes the importance of parents as a consistent and familiar source of comfort for their newborn during this time.

As part of the treatment plan, an occupational therapist should be prepared to work with parents who are experiencing a range of emotions. Some parents may be fearful for their baby's health or the reactions that family members may have. Other parents may be angry at their partner for not doing more or demanding toward the NICU staff for not being helpful enough. They may even be guilty or angry at themselves for causing their baby's condition. These emotions may only be amplified by feeling powerless to help their child in their time of need. Some parents during this time also mourn the loss of the healthy child they expected to give birth to. While some of these reactions are perfectly acceptable responses to an event as trying as this, they can make treatment more difficult if they are not acknowledged and addressed.

Section 4: Personal Reflection

How might an occupational therapist professionally respond to a parent who is having difficulty coping with their baby's condition?

Section 5: Feeding [23,24]

It is ideal for newborns to be fed with breast milk, which offers antibodies for long-term immunity. Breast milk has also been shown to reduce a baby's risk of sepsis, infection,

and meningitis. Mothers can offer this via breastfeeding, pumping and bottle feeding, or using breast milk from a donor. Depending on the baby's medical status, they may need to take milk through a feeding tube. Some babies may be so fragile they can't tolerate breast milk yet and they receive fluids through an IV.

While there are many ways a baby can receive breast milk, parents often believe the milk is more important than breastfeeding itself. The breastfeeding process serves a large benefit to newborns in the realm of attachment, positioning, and the development of the suck reflex. Babies and mothers may benefit from nipple shields, artificial milk, pacifiers, and various bottles to assist in improving feeding independence.

Facilitated infant-directed feeding is the focus of an occupational therapist during this time. Therapists should ensure that parents facilitate feeding with their baby, but they should also encourage the baby to demonstrate the right reflexes, have an upright posture, and bring their hands to the face to assist. Positioning is key to decrease reflux and lessen the impact of gravity on lung function during feeding. OTs should also monitor the baby for hunger cues and signs of stress or satiation during feeding, since this can impact their intake. Therapists must educate moms how to facilitate by eating fruits and vegetables, doing kangaroo care, pumping their breasts frequently until they are empty, and getting enough rest.

Occupational therapists in this setting work collaboratively with speech therapists and lactation consultants to address feeding-related issues. Speech therapists can administer a Modified Barium Swallow evaluation, but anyone on the team can raise a red flag if they suspect a baby has issues like low heart rate, coughing, choking, or apnea during feeding. These providers all help determine if a baby needs a different consistency of milk, more or less calories, or a different nipple to improve success. Lactation consultants can assist the baby and mother with issues latching, positioning, or pumping breast milk. Follow-through is crucial so it is important that babies get early intervention and lactation consultant referrals for home visits.

Section 5: Personal Reflection

What type of education might a lactation consultant give a new mom with a premature baby?

Section 5: Key Words

Modified Barium Swallow: This is an evaluation of a person's swallowing abilities using an x-ray to view the esophagus as they eat various foods and liquids; for babies, the test

exclusively uses liquids

Section 6: Other Interventions [25,26,27]

We've mentioned before how crucial positioning during feeding is, but positioning at all times is important because it helps the baby interact with their environment better. By being positioned on their back, babies are able to visually see things around them and can explore different forms of stimulus. While it may not be medically appropriate for some babies at this time, being in a prone position is also crucial for play, exploration, and strengthening of the back and core muscles in the abdomen. This is more crucial when babies go home, since they will need these skills to lift their head, move their arms, and begin to crawl.

Positioning also plays a part in discharge from the NICU. Newborns must pass a car seat test around one week before going home. The baby will sit in the car seat for 90 to 120 minutes or the length of your car ride home while providers monitor their oxygen levels, heart rate, and breathing. If the baby does not pass this test, providers may recommend a car bed so they can remain fully reclined to keep their vitals stable.

Play-based interventions -- focused on sound, sight, and touch -- are another big part of a baby's development in the NICU. Play encourages bonding but also helps the brain and body develop. While play is generally regarded as good, it can be a lot of stimulation for premature babies since their sensory systems are not as developed.

When starting off, aim to target one of the senses at a time. Go slowly and stop if there are signs the baby is overstimulated, such as closed eyes, looking away, or crying. Some babies prefer to just look at faces, so play may be as simple as your visible presence. If the baby tolerates that well, begin moving your head slightly or presenting your finger and moving it around. Babies learn to recognize songs early on, so you can hum or gently sing to them. It is important that singing matches the baby's heart rate, so focus on calming and gentle tones to soothe the baby.

Calming and soothing should also be a focus while establishing sleep routines for both baby and mother. This is another area that therapists can have a tremendous impact by helping establish good sleep hygiene. Some of the best ways to do this is through massage, gentle music, and light touch. It is important to ensure the baby can safely tolerate massage, so they may need to be medically cleared by their doctor first. As therapists begin to develop a more consistent sleep schedule for the baby, it is important they educate parents on doing the same (and adjusting their own sleep

patterns) to accommodate the baby.

Section 6: Personal Reflection

What are some bonding activities that parents can incorporate into a baby's nighttime routine to assist with sleep and relaxation?

Section 7: NICU Credentials [28,29,30]

Occupational therapists who have extensive experience in the NICU can demonstrate these skills by receiving a certification as a neonatal therapist. In order to be eligible for this certification, a therapist must have 3 years of work experience as an occupational therapist, 3500 hours of work experience in the NICU, and 40 hours of continuing education related to work in the NICU (done in the past three years). This eligibility allows someone to take the board certification exam. Once they pass this exam, they can use the credentials "CNT" after their name, which stands for certified neonatal therapist. Certifications are valid for 5 years and must be renewed by keeping up with specific continuing education requirements.

NICU therapists can also expand their knowledge and skill set in the area of infant massage by receiving a CIMI certification. As a certified instructor of infant massage, therapists are not only able to perform massages on infants when appropriate and medically necessary, but they can also educate parents on these techniques. This certification entails taking five courses followed by an exam to test the applicant's knowledge.

The National Association of Neonatal Therapists also provides membership for those who work in the NICU. This organization offers continuing education, journal articles, latest news, conferences, and other events related to NICU treatment.

Regardless of what level of interest you have in the NICU, these credentials and organizations can further enhance your knowledge in the area while improving your ability to serve newborns and their parents in this capacity.

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