

2021

Shaping the Lives of Little Ones Developmental Equipment Project

Marilyn Tyre
Nova Southeastern University

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Shaping the Lives of Little Ones Developmental Equipment Project

Capstone Project

Dr. Pallavi Patel College of Health Care Sciences

Department of Occupational Therapy

Post Professional Doctor of Occupational Therapy (Dr. OT) Program

Submitted April 18, 2021

by Marilyn Tyre, MPH, OT/L, C/NDT

to Elise Bloch, E.D., OT/L

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Abstract

Premature infants in the Neonatal Intensive Care Unit (NICU) may experience extensive hospitalizations due to prematurity and medical complications requiring interventions to sustain life and support physiological development. NICU staff are often focused on immediate medical concerns for these infants and may not consider the development and play needs for these long term hospitalized infants. Occupational therapists are aware of the importance of play and supporting the parental role and co-occupations between the infant and parents. This capstone paper discusses the Shaping the Lives of Little Ones Developmental Equipment Project for infants, nurses, and parents designed to provide opportunities for sensory-motor experiences and play for older infants by increasing access to essential equipment and toys for infants' development. Details of the project, methodology, implementation, results and future implications for practice and research are presented.

Keywords: neonatal intensive care unit, premature infants, neonate, opportunity, access, sensory experiences, play, infant- maternal bonding, occupations, co- occupations, toys implementation science, People-Environment- Occupation Model.

Acknowledgements

This capstone student would like to extend thanks and appreciation to the following:

- The Rehabilitation and NICU leadership who supported the mission of the project, permitted space, and provided feedback to develop the project,
- The NICU nurse educator for her collaboration and facilitating communication to the multitude of staff serving the fragile infant population,
- Fellow peers working in the NICU who provided support and feedback to promote the success of the project,
- The Patient and Family Advisory Council for sharing their lived experiences, advocating for infants and their families, and suggestions for the project,
- Dr. Bloch for her invaluable mentorship, constructive input, provision of resources, suggestions for collaboration, and expertise throughout the projects' development and implementation,
- My cohort for providing encouragement, contributing their time and professional guidance,
- Finally, my friends, family, and husband for their love, sacrifices, and unwavering support while completing this capstone project.

Chapter One

Introduction

Premature infants often experience prolonged hospitalization and overstimulating environments, which place them at risk of developmental delay and sensory processing disorders which affect future occupational performance (Celik et al., 2018; Lehner, 2015; Philpott-Robinson, 2017; Zhang et al., 2018). The central nervous system of premature infants is fragile and susceptible to prolonged exposure to the overwhelming Neonatal Intensive Care Unit (NICU) environment. However, graded sensory input helps to develop premature infants' neural systems, protecting them from overstimulation and allowing for engagement in occupations and co-occupations with caregivers (Altimier et al., 2015; Celik et al., 2018; Pineda et al., 2019). The amount and duration of sensory input have protective components, facilitates adequate brain maturation, and deters developmental delay (Altimier et al., 2015; Pineda, 2019). As premature infants grow to full term, their systems mature and help the infant stabilize and regulate state control, manage temperature, respiration, and heartbeat. When infants' physiological status is stable, they are more ready to engage in sensory experiences and play with caregivers. Sensory experiences allow for sensory-motor opportunities, brain development, social interaction, and play (Celik et al., 2018; Dusing et al., 2018; Pineda et al., 2019).

There is a wealth of research on sensory input and sensory processing impacting preterm infant development brain maturation, as well as the importance of parents influencing infants' cognition, motor and social development, and performance (Celik et al., 2018; Griffiths et al., 2019; Spittle et al., 2012). Challenges arise when grading sensory input for infant development and processing, and therefore inconsistencies in clinical practice can occur. Als (1986)

highlighted how the NICU's environment influences the premature infant's development based on the level of sensory input. Parents are essential to infants' development from early birth to full-term and beyond. Infants' medical needs often cause separation from their parents, and the parents have less opportunity to engage with their infant. Parents may lack the skills for their new role as caregivers of premature infants who require specialty care (Baia et al., 2016; Craig et al., 2015).

Parents are essential to infants' development from early birth to full-term and beyond and provide positive sensory input from personal scents, touch, and voice (Pineda et al., 2019). Infants' medical needs often cause separation from their parents, resulting in less opportunity to engage with their infant. Lack of parent presence, separation from their infant, and stressors from the NICU can influence infants' play skills. Parents may lack the skills for their new role as caregivers of premature infants who require specialty care (Baia et al., 2016; Craig et al., 2015). Engaging in sensory experiences provides positive benefits for the infant and parents as they react to each other in play, which is one of the most primitive occupations (Gee 2018; Fraits-Hunt & Zemke, 1996; Pizur-Barnekow, 2014; Price & Stephenson, 2009; Yogman, 2018).

Extended hospital stays expose infants to negative stressors such as medical procedures, elevated noise levels, and separation from their parents (Griffiths et al., 2019; Nair, 2003). NICU intervention models guide best practices for parent and infant interactions, sensory intervention to promote neurodevelopment, and engagement to deter delay. In the NICU, occupational therapy is vital to nurturing the maternal-infant dyad relationship, reciprocity, performance of occupations and co-occupations, and play (AOTA, 2018; Craig et al., 2015). Based on personal observation and experience while working in the NICU for ten years, exploring occupations, co-occupations, and play builds a foundation for enhancing sensory experiences in the NICU. The

Person-Environment-Occupation Model, Implementation Science, and nursing education provide theoretical support for interventions within the NICU.

Demographics of the Local Community and NICU

Demographics in the NICU and the surrounding community are significant when considering if a program or project is practical, affordable, a good fit, and accessible to the target population (Minkler, 2012; Scaffa & Reitz, 2014). The Hollywood, Florida community is heterogeneous, with a population of 154,823 (U.S. Census Bureau, 2018). Similarly, various ethnicities comprise the Hollywood and NICU communities, with the majority being White (70.6%), followed by Hispanic or Latino (35.3 %) Black or African American (17.7%), American Indian and Alaska Native (0.2%), Asian (2.3%), and Native Hawaiian (0.1%) (U.S. Census Bureau, 2018).

Socioeconomic levels of Hollywood appear to be predominantly middle class, and 15.2% classify in the poverty category. The median household income is \$50,019, the male median income is \$ 30,388, and the female median income is \$ 21,965 (U.S. Census Bureau, 2018). Financial status may impact families' abilities to access specific health care, make decisions about health care, or the ability to participate in healthcare practices to assist with caring for their infant.

The education levels of Hollywood residents range from high school (87%) to bachelor's degrees and higher (26.2 %). Educational materials for programs and projects (website, resources, flyers) should be between 6th to 8th-grade reading levels, such as public newspapers for optimal comprehension and application of the information to a broad population with a different educational and socioeconomic backgrounds (Quora.com, n.d.).

Approximately one in six children in the United States live with one or multiple developmental disabilities or other developmental delays (CDC, 2019). The Wasie Neonatal Intensive Care at Joe DiMaggio Children's Hospital is the largest in Broward County and provides interventions to serve the large population of children at risk of developmental delay. This NICU provides essential care to the unique population of premature infants at high risk of developmental delay in the 84 critical care beds (62 Level III beds, 22 Level II beds) (Jdch.com, 2020). Infants in the NICU ages vary from 23 weeks up to 1 year of age. Due to the wide range of ages, infants require a broad spectrum of care to reduce the risk of delay and to provide opportunities for increased sensory experiences for older infants. NICU staff care for critical infants who require specialized care and are at risk of developmental delay and have reduced opportunities to bond with their mothers and engage in sensory experiences.

The Problem and Background

Premature infants are at risk of developing delays due to underdeveloped systems and organs, physical instability, and necessary medical care limiting interaction with parents and opportunities to bond and play with their caregiver (Craig et al., 2015; Pineda et al., 2019). As infants stabilize and grow in unit, they often remain at risk for developmental delay due to the staff focusing on medical needs, and parents and nurses may have limited knowledge about development, sensory experiences and play skills. The NICU environment may lack toys, equipment, and space to facilitate sensorimotor experiences.

Developmental care prepares the environment and stabilizes the young premature infant for optimal brain development, growth, and interaction with parents (Altimier, 2016; Griffiths et al., 2019; Soleimani et al., 2020). Developmental care is defined as strategies to modify the NICU environment and staff approaches to care to reduce neonates' overall stress and effects on

their developing brains (Als, 1986; Altimier et al., 2015; Griffiths et al., 2019). Developmental care promotes an infant's behavioral organization, biological stability, sleep patterns, and growth (Altimier et al., 2015). Developmental care can mitigate overstimulation from the neonatal intensive care unit.

The Neonatal Intensive Care Unit

The neonatal intensive care unit (NICU) is a critically busy and stimulating environment that can negatively impact infants' brain development. Open layouts and private rooms comprise the NICU, which presents benefits and barriers for meeting infants' medical needs and limits bonding between infant and parents. The intended purpose of individual rooms is to reduce sensory stimulation from noise, light, and from the active NICU environment. Private rooms also enhance neurodevelopment and promote caregiver interaction and infant performance (Smith & Pineda, 2016). However, Smith & Pineda (2016) also reported potential for sensory deprivation from isolation in the infant's private room setting. Research by Smith and Pineda (2016) revealed positive outcomes from sensory input for infants in private settings such as improved neurobehavior, decreased medical events and infections, increased weight, and achieving full feeding at reduced gestational age. Smith and Pineda (2016) reported surprising results about infants in open NICU layouts which exhibited advanced brain organization and language development when evaluated by standardized testing. Research shows positive advantages of both private and open settings in the NICU, which prove beneficial to infants and their parents despite the high level of stimulation in the environment (Philpott-Robinson et al., 2017; Pineda et al., 2019).

Environmental Sensory Stimulation

Researchers recognize the challenges in determining infants' optimal sensory experiences in the NICU (White, 2018; Zores et al., 2018). For example, sudden changes in lighting disrupt the infant's restful sleep. However, light in the NICU should follow a circadian rhythm versus frequent low-level lighting or intensely bright lighting (White, 2018; Zores et al., 2018).

Additional noise and auditory stimulation should not exceed the recommended maximum level of 45 decibels (Almadhoob & Ohlsson, 2020). However, studies describe adult speech and reading to infants as beneficial auditory stimulus (Griffiths et al., 2019; Witt Mitchell et al., 2015). Sensory input and the environment influences the infant's development of their sensory system, information processing, and affects the infants' performance (Nair, Gupta, & Jatana, 2003; Witt Mitchell et al., 2015). Sensory stimulation in the NICU environment affects infants' ability to process sensory information and impacts the development of play, social engagement, learning, and self-care occupations (Miller et al., 2007; Witt Mitchell et al., 2015). The level of sensory input from the environment and from necessary procedures, increases infants' stress and alters infant responses and the course of infant development (Almadhoob & Ohlsson, 2020; Pineda et al., 2019; White, 2018; Zores et al., 2018). Infants and caregivers are subject to various levels of stress during the NICU hospitalization.

Infant and Parental Stress in the NICU

Premature birth and the surrounding months and medical events are stressful for both the infant and the parents in the NICU (Craig et al., 2015). Premature infants are born early and are not physically prepared for the extrauterine environment of the technical NICU (Lehner, 2015; Pineda, 2019). Separation is shared stress for premature infants and their parents. They spend time away from one another due to procedures, structured touch times, intrusive medical

equipment, and limited maternal engagement for performing parenting skills (Bonacquisti et al., 2020; Craig et al., 2015). Holt and Makati (as cited in Lehner, 2015) emphasized that stress during infancy modifies brain waves' configuration in the learning and the memory center, as identified by electroencephalograms (EEGs). These alterations in brain structures potentially reduce brain maturation and cognitive abilities for premature infants already at risk of developmental delay and intensify with prolonged hospital stays (Lehner, 2015). Increased stress levels impact parents' and infants' ability to engage in sensory experiences and play, which can also reduce stress. Yogman (2018) reported that play helps control stress, is an outlet for happiness, and is a means for communication through giving and taking responses between parents and children. However, infants and parents experience a high level of stress from the NICU environment. Additionally, the longer the hospitalization, the longer the exposure to the stressful environment.

Craig et al., (2015) describe parental stressors as decreased support and reduced opportunities to perform parenting skills. These stressors may yield mental health issues of depression, and post-traumatic stress disorder (Bonacquisti et al., 2018). Mental distress sustained by parents in the NICU evolves from parental challenges of navigating the tapestry of insurance, medical jargon, along with fear and anxiety of their infant's illness and medical needs, losing and resuming their parental identity, and loss of control (Baia, 2016; Bonacquisti et al., 2020; Clotey & Dillard, 2013; Geller, Bonacquisti, & Patterson, 2018).

Mothers of preterm infants demonstrate postpartum anxiety symptoms and adjustment disorders that are associated with the delivery of infants with very low birth weight, highly stressful births, and complications afterward (Bonacquisti et al., 2020; Helle et al., 2016). The stress from the parent and the infant is cyclic where parents extreme stress impacts the mother –

infant dyad. Stress leads to adverse outcomes of infant's social and emotional development, cognitive behavior performance, infant attachment, parental bonding, and limited maternal engagement (Bonacquisti et al., 2020; Craig et al., 2015). Additionally, the NICU environment can compromise bonding and attachment between mother and child due to the physical separation, intrusive medical equipment, and the mother's limited participation in the child's care (Bonacquisti et al., 2020). Inconsistencies in parental engagement with premature infants and term infants lead to insecurities, decreased attachment, and trusting relationships, and may progress into developmental behavior disorders in childhood (Lehner, 2015).

Long-term Patients Influenced by Tailor Enhanced Environments

Infants in the NICU may experience extended stays due to extreme prematurity, underdeveloped systems, medical complications, and diagnoses putting them at risk for developmental delay, but may have more favorable outcomes from altering the environment. Common diagnoses treated in the NICU are bowel obstructions, cardiac anomalies, chronic lung disease, congenital anomalies, necrotizing enterocolitis, seizures respiratory distress syndrome, retinopathy of prematurity, hypoxic-ischemic encephalopathy, and neonatal abstinence syndrome (Jdch.com, 2020). Infants with neonatal abstinence syndrome can have prolonged hospital stays for medical management, weaning medications, and interventions to modify sensory experiences.

The rate of Neonatal Abstinence Syndrome (NAS) continues to increase due to rampant opioid use in the United States (Ko et al., 2016; MacMullen et al., 2014; Oostlander et al., 2019). NAS is a condition where neonates go through withdrawal after suddenly experiencing a sudden termination of drug exposure during pregnancy, most commonly opioids (Edwards & Brown, 2016). Characteristic signs of NAS consist of high irritability, extreme and penetrating cries,

increased muscle tone, diminished quality and length of sleep, inability to self-console, tremors, and seizures (Grim, Harrison & Wilder, 2013; Jensen, 2014; Oostlander et al., 2019). Effective approaches for addressing symptoms of infants with NAS include medication and nonpharmacological interventions.

Several nonpharmacological approaches for treating NAS infants include positioning, snugly wrapping, gently touching, and regulating temperature (Oostlander et al., 2019). Environmental modifications such as music, low lighting, mothers' voice, and essential scents are effective methods to reduce irritability and advance feeding skills. In addition to changes to the external environment, changes to vestibular input assist to calm infants with NAS. Rocking and non-oscillating water beds are helpful nonpharmacological approaches for calming, decreasing hyperirritability, and increasing sleep for NAS infants (MacMullen et al., 2014; Oostlander et al., 2019). Moreover, MamaRoo infant chairs/swings provide vertical rocking as a soothing stimulus to decrease symptoms of withdrawal and calm the infant. The MamaRoo infant chair/swing is a feasible intervention for enhancing infants' environments and positive sensory exposure opportunities. Hydrotherapy is another vestibular based intervention that has calming effects that influence positive sleep patterns and weight gain for NAS babies (Macmullen et al., 2014; Jensen, 2014; Oostlander et al., 2019). Water is a medium to enhance infants' sensory experiences through thermal and tactile sensation. Occupational therapists treat infants with NAS using nonpharmacological interventions and use conceptual and practice models to guide practices to prepare infants for positive sensory experiences.

Strategies to Improve Infants Sensory Experiences and Parent Skills

Occupational therapists working in the neonatal intensive care unit facilitate an environment conducive to physiological stability, promote occupations and co-occupations of

infants and parents, provide sensory opportunities to promote brain development and reduce infant stress (AOTA, 2018; O'Brien, 2015; Pineda, 2016). Methods to manage the environmental context include controlling excessive light and noise from the external environment and monitors and medical machinery. Additional methods to control the environment include educating staff and parents about excessive noise levels and reducing speaking volumes, affecting infants' heart rate, and breathing rate, leading to physiological instability and stress for the infants.

Additionally, occupational therapists facilitate parenting occupations, such as kangaroo care, holding, and diapering their baby during infants' therapies. Strategies to facilitate infants' brain development and reduce infant stress include listening to parents' voices, observing parents' faces, and receiving caregivers' touch. Occupational therapists' roles in the NICU are multifaceted and include evaluation of infants, interventions developed through occupation-based and occupation centered approaches for infants and parents.

An occupational therapist provides an environment that promotes reducing stress, positioning to facilitate state regulation, sensory and developmental opportunities to meet the needs of the premature infant. Moreover, occupational therapists support parents in meeting occupational roles through education, modeling, and practicing skills to care for their infant (AOTA, 2018). Occupational therapists' roles are to assist parents in bonding with their infants and developing skills for parenting while in the NICU and after discharge (AOTA, 2018; Orton, 2018; Cardin, 2020). This capstone aligns with the role of occupational therapy in the NICU and infants and caregivers participation in meaningful occupations such as play, parenting in the realm of bonding and enhancing infants' skills and development.

This capstone project originated from an observation that full term infants with long hospitalizations in the NICU inconsistently engaged in play activities and sensory experiences with the caregivers and staff. This inconsistency for infants to participate in play and age-appropriate activities is a consequence of limited staff, volunteers, parental presence, and availability of toys. These factors influenced and reduced infants and caregiver's ability to bond, play, engage in infant and parenting co-occupations and reap the benefits from interaction. This capstone seeks to bridge the gap between infants' reduced opportunities for play, access to developmental equipment and toys, caregivers' knowledge of play, and infant-caregiver bonding. Methods used to bridge the gap include a grant to provide financial support for toys and equipment, and a comprehensive staff and family education program on infant and maternal play and bonding.

It is crucial and impactful for parents to be present for teaching and coaching which is vital for enhancing infants' sensory experiences and occupations and increasing parental knowledge. Educational methods for parent will include PowerPoint or video discussing or illustrating occupations, play experiences, and activities for infants and caregivers to increase opportunities for sensory experiences. Patient and family-centered care is the best practice in the NICU to yield positive infant outcomes through parent education and training, active participation in co-occupations collaboration with staff, and to provide infant care (O'Brien et al., 2015; O'Brien et al., 2018). Additionally, this capstone project is guided and shaped by the input from nursing staff, therapists working in the NICU, and moms serving on the NICU Family Advisory Council with previous personal experiences in the NICU unit.

Purpose: To create a project for infants, nurses, and parents to enhance infants' sensory and play experiences and increase knowledge of nurses and self-efficacy of parents.

Short-term Objectives

- 50% of nurses in the NICU will view educational video
- 50% of participating nurses will complete a pretest, and posttest after the educational video to assess change in knowledge about occupational therapy, and sensory experiences (The NICU nurse educator provided statistical data about the percentage of participating nurses and the number of completed pretest and post-tests to meet short-term goals).

Long term Objectives:

- Improve access to essential equipment for development, sensory-motor experiences, and play for premature infants and term infants
- Promote consistent sensorimotor play experiences facilitated by nurses and families while infants are in the NICU.

Definitions provide a better understanding of concepts for Shaping the Lives of Little Ones developmental equipment project and include the following.

- Patient and Family-Centered Care is a methodology for creating, delivering, and assessing health care where healthcare providers, patients, and families form supportive relationships in which each entity benefits (Institute of Patient and Family-Centered Care.org, 2020).
- Bonding is a process between parents and infants where a connection is formed between infant and parent due to their interaction when receiving, interpreting, and giving cues. Cues include but are not limited to facial and vocal expression, heart rhythm, temperature, skin color, and scent (Kommers et al., 2016; Pizur-Barnekow et al., 2014; Ralli et al., 2016).

- Sensory Experiences provide infants with opportunities to experience and learn through five senses of touching, hearing, seeing, moving, tasting, and smelling and manifested through play (Griffiths et al., 2019).
- Knowledge change is a measurement of the increase in knowledge measured by comparing pretest and posttest responses.
- Self-efficacy means one's beliefs in their skills and abilities to carry out the skills (Lee et al., 2012; Kachoosangy et al., 2020). Education and training can improve one's perception of the skills and abilities and improve outcomes, occupations, and co-occupations of parenting and play.

Summary of Introduction

Infants born prematurely are subject to the stressful NICU environment, medical procedures, and reduced opportunities to engage with caregivers and parents ranging from birth to full term and beyond. The purpose of the project is twofold to 1) provide opportunities for sensory experiences for stable infants for brain development and to deter delay and 2) increase knowledge of nurses and parental self-efficacy for sensory play with infants (Lee et al., 2012; Kachoosangy et al., 2020). The project supports parents and nurses to engage infants in activities and sensory experiences. Additionally, the project supports parents increasing knowledge about skills for engaging infants in occupations and co occupations of play and bonding with their infants. The Joe DiMaggio Children's Hospital Foundation, Patient Family Advisory Council, leaders of the NICU, nurses, and inpatient therapy services support the project's concepts. The project's potential benefits could include increased staff, family, and community knowledge sustained culture of patient and family-centered care, parent empowerment, and increased infant engagement and development.

Chapter Two

Literature Review

Premature infants often have prolonged hospital stays due to their undeveloped systems, which require time and often medical interventions to help them prosper and develop. Extended hospitalization and medical stability, and the complex NICU environment place them at risk for developmental delay (Celik et al., 2018; Lehner, 2015; Philpott-Robinson, 2017; Zhang et al., 2018). Moreover, the context of the environment coupled with the infants' medical needs and equipment, decreases opportunities for parental interaction, bonding, and engaging in activities typical for infants and caregivers such as feeding, bathing, sensory experiences, and play (Craig et al., 2015; Pineda et al., 2019).

Infants born prematurely require specialized care for stability, nurturing infants' developing systems, and brain formation to prepare them for interaction with caregivers well after achieving full-term age. Specialized approaches to developmental care and patient and family-centered care promote parents' participation in the care of infants and practices to decrease infant stress (Pineda, 2019). Supportive models for NICU intervention to enhance infant development and interaction and to build caregiver skills for parenting are explored.

This literature review provides evidence-based support for the benefits of the patient and family-centered care, the role of occupational therapy in the NICU for providing interventions for infants and families. Additionally, this discussion promotes infant-parent engagement in occupations and co-occupations, sensory experiences, and play for infant-parental bonding, brain

and motor development, and language skills (Barnekow et al., 2012; Pizur-Barnekow, 2014; Price, 2009; Yogman, 2018).

Supportive Models for NICU Intervention

Developmental Care

Griffiths et al. conducted a systematic review from 2009 to 2018 and found that the incidence of a few enduring neurodevelopmental problems decreased, specifically cerebral palsy; however, the rates for learning and behavioral issues did not show the same trend. During the infant's earlier months and years, the brain development is most influenced by experiences that help shape and protect the brain's development, reduce infant's stress, and provide an environment conducive to the premature infant's development (Griffiths et al., 2019).

Neuroprotective developmentally supportive care (NDSC) is staff practices that support the premise of developmental care and is considered best practice in NICUs (Als, 1986; Griffiths et al., 2019). The purpose of NDSC is to enhance the protection of infants' neurological systems from stress and improve infants' neurodevelopmental results through specific strategies tailored to the infant and their environment (Altimier et al., 2015; Griffiths et al., 2019; Spellman, 2019)

Griffiths (2019) highlights NDSC principles as a) minimizing parent/infant separation, b) protective sleep, c) feeding, d) kangaroo care, e) pain and stress management, f) parent engagement, g) supportive positioning, h), consistency and presence of parents and i.) staff education and training (Griffiths, 2019, Altimier, & Phillips, 2016). Griffiths et al. (2019) provide recommendations to provide a milieu to enhance infant development, caregiver engagement and skills, to support infant outcomes.

Recommendations for Practice Guidelines

Suggestions for practice guidelines consist of family education and training to increase and reciprocate infant and parent skills and promote bonding (Griffiths et al., 2019). Literature supports engagement in play, reading, and other pleasant interactions that promote parent-infant bonding (Dusing et al., 2018; Griffiths et al., 2019). Literature suggests staff members provide a nurturing sensory environment with early opportunities for touching, hearing, seeing, moving, tasting, and smelling (Griffiths et al., 2019). Multisensory exposure enhances premature infants and caregiver outcomes in the NICU setting (Griffiths et al., 2019; Pineda et al., 2019). Individualized sensory plans, private rooms, noise, and light control can improve infant-caregiver outcomes and interactions. Expanding sensory opportunities for those at risk of sensory deprivation due to lack of caregiver availability is addressed through open layouts in the NICU (Griffiths et al., 2019; Pineda et al., 2019; Smith & Pineda, 2016). Timing sensory input and scheduling sleep are beneficial to brain development and state regulation (Van den Hoogen et al., 2017; White, 2018; Zores et al., 2018). Interaction with parents facilitates bonding, progression of neurological development, communication, cognitive and social development, play, and supports patient and family-centered care (Altimier et al., 2015; Frolek Clark & Schlabach, 2013; Griffiths et al., 2019).

The Rational for Addressing Practice in Developmental Family Care

The interplay between the infant's behavioral subsystem and the environment, shapes infants' developmental outcome, and influences future pediatric illnesses (Als, 1986; Griffiths et al., 2019). Staff inconsistently practice developmental care which is best practice in the NICU (Pineda et al., 2019). Practices of developmental care varied from setting to setting, and the lack of one operative definition of developmental care in research hindered the initial widespread

acceptance of developmental care (Gibbons et al., 2008). A more comprehensive approach to address sensory input, developmental needs of premature infants, and infant-caregiver occupations need further exploration (Pineda et al., 2019; Smith & Pineda, 2016). Occupational therapists address an individual's needs across the life span commencing with premature infants and developmental care, the term infant, school-age play, and supporting mothers in their new roles (Pineda et al. 2019; Smith & Pineda, 2016, Als, 1986).

Synactive Model of Neonatal Behavioral Organization

Heidi Als (1986) developed the Synactive Model of Neonatal Behavioral Organization. The human embryo and infant advances through an equilibrium of approximation and evasive behaviors resulting in communication between the infant's subsystems and the infant's contact with its environment (Als, 1982; Als, 1986). In her model, Als (1982) outlines the subsystems impacted by the environment as autonomic, motor, state, and attention /interaction and regulatory affected by the environment. When considering the influence of the environment on infants' subsystems, one must consider whether the infant can attain and sustain a calm and relaxed state and is physiologically stable enough to engage with their caregiver (Als, 1982; Als, 1986). The goal is to reduce infants' stress, provide a supportive environment for families to engage with the infant and participate in their care (Als, 1982; Als, 1986; El-Nagger & Orban, 2016).

Patient and Family-Centered Care

Patient and family-centered care is a methodology to create, deliver, and assess health care where health care providers, patients, and families form supportive relationships in which each entity benefits (Institute of Patient and Family-Centered Care.org, 2020). The premise of

patient and family-centered care (PFCC) is to empower families to participate in patients' services, team meetings and actively participate in their care (O'Brien, 2015; O'Brien, 2018). Authors use several versions of the concept patient and family-centered care which is sometimes referred to as patient centered care (Millenson et al., 2016)

When families have access to information about their infants and participate in care, infants have better outcomes. (Bruton et., 2018; Craig et al., 2015; AOTA, 2018). John Bowlby and James Robertson developed the patient and family-centered care concept during world war II (Jolley, & Shields, 2009). The theorist illuminated attention to the impact of children's separation from their parents and the trauma of world war II. Bowlby and Robertson visually documented the effects of prolonged hospitalization on children's health and how parents' presence decreased the negative impact on children's health. Since world war II, several organizations focused on the welfare of sick children and methods to incorporate mothers into the hospital setting to reduce parental separation and deter the negative impact on children's mental status. Organizations that focused on children's wellbeing included the National Association for the Welfare of Children in Hospital, Action for Sick Children, and the Institute of Family-Centered Care in 1992 (Jolley, & Shields, 2009). Over several decades, various care models developed, such as parent participation, care-by-parent, partnership-in-care, and family-centered care, to integrate the parent into engaging and caring for their child (Jolley, & Shields, 2009). Improving caregivers' outcomes and supporting caregivers can yield better outcomes for the patient (Davidson et al., 2017; Lynn, 2014). PFCC also leads to improved health results, better patient and family experiences of healthcare, improved satisfaction by healthcare providers, and wiser distribution of resources (O'Brien, 2015; O'Brien, 2018).

Patient and family-centered care acknowledges the crucial significance of the family unit to a patient's progress. PFCC highlights healthcare providers' obligation to optimally support caregivers of patients, grounded on evidence-based approaches (Davidson et al., 2017).

Literature is abundant on the use of patient and family-centered care in the NICU to support and educate parents to deter feelings of incompetency, improve confidence and self-efficacy and skills for caring for their infants in the NICU and post-discharge (Griffiths et al., 2019; Oostlander et al., 2019). Guidelines provide structure for the development of policies and procedures for implementing consistent care practices and opportunities for parents to engage in sensory experiences, occupations, and co- occupations.

Evidence-Based Support of the Benefits of Patient and Family-Centered Care

Patient and family-centered care in the neonatal intensive care has mutually inclusive benefits among infants and their caregivers. Patient and family-centered care consists of parental presence, family engagement in team rounds, and performing infant's daily living activities. PFCC also includes reciprocal communicating with the healthcare team, practicing hand hygiene, sleeping-in to assume full care of infants, education via demonstration, materials, and video (O'Brien, 2013; Verma et al. 2017; Zhang, 2018).

Researchers describe positive outcomes with PFCC implementation in the NICU for infants that include : weight gain, decreased length of stay and readmission, reduced infant and parental stress, decreased parental anxiety, improved parent satisfaction and confidence, and infant breastfeeding (Altimier et al., 2015; Bruton et al., 2018; Craig et al., 2015; Franck et al., 2020; O'Brien et al., 2015; O'Brien et al., 2018; Zhang et al., 2018).

In a cluster-randomized controlled trial across multiple NICUs, O'Brien et al. (2018) implemented a patient and family-centered care approach where the parents' assumed the role of

primary caregiver for six hours a day. Parents' duties included participation in daily team rounding, infant documentation, and journaling about their infant status. Additionally, parents performed infants' daily feeding, hygiene, dressing, and kangaroo care. The parents received support from nurses and peer parents in the NICU and from educational presentations. Using the patient and family-centered care approach and increasing the time for parents' involvement yielded positive outcomes for the infants and caregivers. Infants demonstrated increased weight, improved breastfeeding, and mothers reported reduced feelings of stress and anxiety (O'Brien, 2018). PFCC is a practical and useful approach for caring for infants and their caregivers and producing positive outcomes. PFCC may prove beneficial for parents and nurses to provide sensory experiences to increase opportunities for play and co-occupations for full-term infants.

The Role of Occupational Therapy

Occupational therapists have specialized expertise to work in the NICU environment and support infants, parents, and nurses who are also primary caregivers of premature infants during their hospital stay. Occupational therapists provide individual assessments, treatment, and facilitation of infant and parental occupations, which impact the infant's developmental progression from premature to full term to kindergarten age (American Occupational Therapy Association, 2018). Occupational therapists assess the premature infants' posture, sensory processing, tolerance for handling and readiness for activity. Occupational therapists also support parents to competently perform daily living activities, such as feeding, bathing, sleeping, and play skills (AOTA, 2018; Orton et al., 2018).

Occupational therapists understand the interaction between the infant and their sensory systems, the parent, and the environment. Occupational therapists supports parents for developing capacity and assurance for taking care of their infant (AOTA, 2018). Occupational

therapists facilitate infants and mother engagement in various occupations and co-occupations to nurture infant and parent bonding and build reciprocal interactive relationships (Cardin, 2020).

Infant and Maternal Reciprocity

Caregivers play an essential role in infant development and benefit from reciprocally interacting with their infants (Gee, 2018; Gee, Engle, et al., 2018; Gee, Golden, et al., 2018). Reciprocity occurs when a baby and parent participate in activity, where each reacts to the action of the other, and receives gains in their cognitive or emotional state or from the resulting action (Apicella et al., 2013). Gee and Golden (2018) observed and video recorded 8, 12, and 16-month infants and mothers in a play lab during hour intervals. The researchers analyzed 20 critical minutes for the frequency and duration of sensory reactivity and responsiveness. Research results showed that mothers provided sensory input over half of the study time. Mothers predominately provided auditory and tactile sensory stimulation, with the least frequency in the vestibular realm (Gee, Golden, et al., 2018).

Gee and Engle (2018) analyzed the rate and length of time for infant and maternal bidirectional reciprocity related behaviors for visual and fine motor advancement. Researchers assessed the infants during the same time frame of 1 hour at 8, 12, 16 months of age. Study results indicated that the older the infant, the longer length of time their visual examination, object management, object manipulation, and grasp on either side was by 23.5%-27.75%. Moreover, the older the infant, the rate of occurrences decrease for the same domains (Gee, Engle, et al., 2018). Researchers imply that the results are due to the infant's skill development and increased attention to objects instead of parental stimulation and input (Gee, Engle, et al., 2018).

Evidence-based research supports reciprocity between infants and their mothers in maternal-infant interactions, co-occupation, emotional reciprocity, and language (Swann, Hambleton, Aubuchon-Endsley, Brumley, Gee, & Devine, 2016). Gee highlights that infant's levels of cognition and perception influence motor and linguistic development. Additionally, Gee reported that higher rates of caregiver-directed utterances linked to infant gazes at the caregiver. Increased incidences of caregiver touch were associated with increased frequency of infant touch and infant linguistic utterances.

Importance of Occupations and Co-occupations in the NICU

Through occupations infants develop skills through the five senses and enhance the specificity of these senses (Gee et al., 2016; Gee et al., 2018). Infants have the right to engage in occupations and to improve through engagement in activity for wellbeing and social inclusion (Ginsburg, 2007; Wilcock & Townsend, 2004, p. 80; Smith, 2019). Occupation is significant to and pivotal to human survival and presence (Wilcock & Townsend, 2004). Limitations in the human ability to engage in occupations is a form of occupational injustice. Additionally, caregivers engage in co- occupations with their infants, which are meaningful and enriching for the infant and the caregiver (Pineda et al., 2019; Cardin, 2020).

The Occupational Therapy Practice Framework defines occupations as "everyday activities that people do as individuals, in families, and with communities to occupy time and bring meaning and purpose to life" (AOTA, 2014, p. S5). Co-occupations consist of activities engaged in by the parent and infant (Esdaile & Olson, 2004). The AOTA (2018) describes occupations and parent abilities which parents need to become more proficient in caring for their infant during the parent-infant dyad. Occupational therapists play a vital role in nurturing parents in the initial caregiving stages for engaging with their infants, touching, handling, holding their

infants, and comprehending, interpreting, and reacting to infants' behavioral signs and stress signals (AOTA, 2018). Additionally, occupational therapists assist parents to build capacity in occupations and feeding (breastfeeding, bottle feeding) kangaroo care, diapering, dressing, and supporting sleep and rest (AOTA, 2018). Moreover, occupational therapists evaluate infants' performance skills and abilities to engage in sensory experiences, occupations and play despite medical issues and their influence on engagement (AOTA, 2018).

Benefits of Play

Maternal-infant play is one of the initial co-occupational practices impacting infants' development (Fraits-Hunt & Zemke, 1996; Pizur-Barnekow, 2014; Price & Stephenson, 2009; Yogman, 2018). Play is part of the foundation that sculps safe, secure, and supportive relationships with all caregivers that children need to flourish (Yogman, 2018).

Play provides several benefits to infants for learning in executive functioning (the process of learning), language, development of social skills, relations with caregiver, physical-motor development, health, and occupations (Barnekow et al., 2012; Pizur-Barnekow, 2014; Price, 2009; Yogman, 2018). Play helps to manage stress and encourage brain function. Play generates changes to brain composition, connectivity, and behavior generated from brain function, such as social skills and executive functioning (Yogman, 2018). Several forms of play improve older premature infants' and parents' skills for bonding to promote healthy development.

Play is vital to infants' and children's development that physicians write prescriptions for play to enhance learning and facilitate healthy child development (Yogman, 2018). Occupational therapists can advocate for play for infant development in the NICU setting and other practice settings and support the American Academy of Pediatrics parental recommendations. The American Academy of Pediatrics suggests communicating socially with infants through

smiles and nonverbal actions, providing an opportunity to engage in unstructured play to develop motor skills (Ginsburg, 2007; Yogman, 2018). Play enables the infant succession from depending on their parents and caregiver to gradual independence, and from caregivers regulating eating, sleeping, and social interaction to more self-regulation (Yogman, 2018).

Reciprocal Play and Social Play

The progression of dependence begins in the infant's first 90 days of life when considered full-term or adjusted full-term age, and when caregivers interact reciprocally with their infant (Yogman, 2018). Caregivers interpret and respond to their infant's nonverbal cues in a give and take manner defined as attunement (one of the earliest forms of play (Stern, 1987; Yogman, 2018). Early turn-taking between infants and caregivers begins at six weeks with smiling and vocal play with parents imitating their infants cooing. Parents follow vocal play by providing small, phrased conversations where the infant provides a vocal response, as an example of precursors to language (Yogman, 2018; Yogman, 1981). Reciprocal play with caregivers begins when the infants are six months at introducing solid foods, requiring giving and receiving indicators for wanting to eat more (Yogman, 2018). At nine months, play influences infant social skills, specifically in action games, cause, and effect games such as this little piggy and peek a boo. Introducing social skills develops when infants establish object permanence when they appear and disappear during peek-a-boo games or when play items are covered and uncovered (Yogman, 2018). Sensory-motor play is essential for shaping infants' development and skills through touch, sight, hearing, taste, movement, and body awareness (Ayres & Robbins, 2005); Celik, 2018).

Sensory-motor Play

One of the initial forms of play is sensory-motor exploration (Case-Smith et al., 2013). Sensory-motor play involves receiving feedback from the senses, resulting in motor response or

skills development through the exploration process. Sensory processing is vital to sensory play and involves more than receiving the sensory information but interpreting, organizing, and using it (Ayres 1972; Ayres, 1979; Fisher & Murray, 1991; Watts, Stagnitti, & Brown, 2014). In sensory-motor play, infants develop fine and gross motor skills and cognitive abilities for problem solving, and memory. Additionally, infants adapt their reactions according to the play activity or environment (Ayres, 1972; Ayres, 1979; Fisher & Murray, 1991; Watts, Stagnitti, & Brown, 2014). Case-Smith (2013) reported that motor skills develop from sensory-motor play, cognitive abilities, and socialization, resulting in expanding and increasing interaction and exploration. Using a contrasting black and white card or mobile is an example of visual play where the infant regards the item and responds with exciting movement of their arms and legs and brightening their eyes (Ralli & Payne, 2016). Infants play through taste where the baby places items on their mouth to explore (fingers, toys, socks). Touch serves as sensory-motor play where infants explore their environment by grasping, clasping, reaching, and pulling their fingers, arms, rattles, crinkly toys, and palm-size toys (Ralli & Payne, 2016).

Tummy time provides an opportunity to play and build upon other sensory experiences from vision, hearing, touch, and movement. In a systemic review of research, Hewitt (2020) reported that tummy time provides an opportunity to play and increase infants' ability to perform large arm and leg movements, move on their stomachs, and deter flattening the back of their heads. Playing while lying on the stomachs helps develop normalcy of spine curvature, neck muscles, and reflexes (Dotseth-Hall, 2015). Dotseth-Hall (2015) reported that studies indicate as high as 75% of parents reported insufficient education and tummy time play practices. Using a patient and family-centered care model, caregivers can receive education and practice to play a vital part in engaging with infants in sensory experiences and occupations.

Bonding may occur during tummy time when infants and parents interact in common activities and play. Various forms of tummy time entail positions where infants are not lying still solely on their stomach but may include burping over caregivers' hands or partially lying over caregivers' legs. After birth, when infants are placed on their mother's chest, it is one of the first forms of bonding and tummy time (Dotseth-Hall, 2015). Face to face tummy time with caregivers allow for reciprocal interaction and bonding (Dotseth-Hall, 2015).

Play and Caregiver Engagement

Play is an essential and primary occupation of infants and children and one of the primary co-occupations between infant and their parents. Play yields socialization with positive affect, vocal play, and reciprocal interaction between the infant-mother dyad (Gee, 2018; Waldman-Levi & Bundy, 2016). Structured exploration provides the opportunity to build motor, sensory, cognitive, and social development through parent's engagement in the co-occupation of play. One of the major aspects in patient and family-centered care is to engage parents in the care of the infant which would include occupations and co-occupations. Moreover, parent roles is to promote play to enhance brain development, social , physical skills as the primary caregiver along with the nurse (Altimier et al., 2015; Dusing et al., 2018; Griffiths et al., 2019; Waldman-Levi & Bundy, 2016; Yogman, 2018). Family interaction with infants yields improvement in infant as well as caregiver outcomes.

In a single-blind randomized pilot clinical trial, researchers executed Supporting Play Exploration and Early Development Intervention (SPEEDI) with preterm infants and their caregivers within the NICU (Dusing et al., 2018). The results demonstrated a significant effect ($p=0.08$) in early problem solving after parents and infants engaged in a total of 5 daily sessions in the experimental group, measured at 30 and 90-days assessment (Dusing et al., 2018).

However, research results did not show a marked difference in reaching between the sample participants. Researchers describe the reaching activity as reaching towards a rattle for 30-second intervals and problem-solving as "visual exploration, object manipulation, and memory" (Dusing et al., 2018; Greenwood et al., 2006).

Pineda (2016) highlights rocking and using infant swings for vestibular input, beginning between 33 and 34-weeks postmenstrual age (Pineda, 2019; Pineda et al., 2016). Rocking and infant swings are beneficial to typically developing preterm infants and infants with other special medical needs, specifically infants diagnosed with Neonatal abstinence syndrome infants. Besides promoting occupations, research supports experiences with low volume auditory output during reading, singing, and playful conversation with the infants. Pineda et al. (2019) reported in a descriptive study of NICU health care workers who provide sensory-based intervention, 86% described the most frequently used intervention was vestibular and was in the form of infant swings.

Neel et al. (2019) report no rehabilitation interventions for remediating sensory processing during the neonatal stage. However, Neel et al. (2019) highlight that four research studies proved that early sensory experiences help form brain growth in previous preterm infants. Development and performance outcomes of premature infants may be contingent on the infant, environment's influence, and ability to engage in occupations and sensory experiences (Law et al., 1986).

Theoretical Perspectives for Intervention in the NICU

The Person-Environment-Occupation Model

In the Person-Environment-Occupation (PEO) model, the interplay of the person, environment, and occupations and alterations of any components influence the final occupational performance (Law et al., 1996). Moreover, Smith (2019) and other researchers reported that the fit of the NICU environment is inadequate for the person (infant and or caregiver) to engage in occupations and co-occupations optimally (Pineda et al., 2019; Santos et al., 2015; Smith & Pineda, 2016). Researchers reported the NICU is a stimulating stressful medical environment that influences caregiver's participation, increases their stress anxiety, and impacts an infant's neurological state regulation (Altimier et., 2015; Griffiths et al., 2019). Caregivers may experience identity disruption after giving birth to the premature infant and may present decreased comfort for performing daily occupations, emergency occupations, and occupations post-discharge (Christiansen, 2015; Smith et al., 2019). Occupational therapists can utilize the PEO model when designing interventions to analyze three influential concepts of infants, parents, and nurses, the NICU, and the opportunity for occupational performance in play and sensory experiences. This capstone paper provides additional details of using the PEO model in the methods section for implementing the capstone project. Implementation science is another theoretical perspective used to integrate research into practice and guide this capstone project.

Implementation Science

Implementation science is the systematic analysis of approaches to promote the adoption of research results into customary practice to enhance the quality and efficiency of health services (Eccles & Mittman, 2006). The rationale for implementation science is to reduce the timeframe between discovering research and publication of evidence-based practice, to

effectively use the research in practice (Cancercontrol.cancer.gov, 2019; Juckett et al., 2019; National Implementation Research Network, 2020). The length of time from research to reach practical application is 17 years, where only 14% is successfully used (Balas & Boren, 2000; Bauer et al., 2015; Juckett et al., 2019). Five active implementation frameworks guide education and programs to structure implementing research into practice more efficiently than the known research to practice gap of 17 years (Cancercontrol.cancer.gov, 2019; National Implementation Research Network, 2020). The five implementation science frameworks are 1) useable innovations, 2) implementation stages, 3) implementation drivers, 4) implementation cycles, 5) implementation teams (Cancercontrol.cancer.gov, 2019; National Implementation Research Network, 2020). The framework components need to be teachable, doable, measurable, implemented over time, include training and trainers to lead initiatives, accessible to determine goal attainment or areas needing improvement, and orchestrated with the team efforts of stakeholders (Cancercontrol.cancer.gov, 2019; National Implementation Research Network, 2020). The application of ideal implementation science can reduce the research to practice gap to an 80% success rate in 3 years versus the current 17 years gap (National Implementation Research Network, 2020; Balas, 2000)

Powell et al. (2015) defined implementation strategies to facilitate the clinician's acceptance and practice of evidence-based practice. Powell et al., (2015) report implementation strategies determine if staff are ready to overcome inhibiting new processes. Powell et al., (2015) report the necessity to host discussions to determine supporters and contributors of strategies and create and accept plans to execute and measure change to meet the needs of clients and leaders (Juckett et al., 2019; Powell et al., 2015).

The occupational therapy profession can promote implementing and adopting evidence-based practices into practice in academia and the clinical settings by collaborating with implementation science researchers and practitioners. Translating knowledge into practice is comprehensive and warrants collaboration amongst peers to implement across several disciplines (Cancercontrol.cancer.gov, 2019; Juckett et al., 2019; National Implementation Research Network, 2020). Proactive processes for implementing strategies to reduce the research to practice gap may yield significantly less time for the actual application, specifically from 17 years to 3 years. Evidence of implementation science strategies is apparent in nursing education and the NICU.

NICU

Galarza-Winton et al. (2013) used principles of implementation science to create, implement, and assess nursing education workshops to institute family-integrated care in the NICU. Thirty-five nurses participated in four – 60-minute workshops, and 21 nurses provided feedback about the information included in the seminar and the workshops' effect. Galarza-Winton et al., (2013) implemented a survey based on the literature review to evaluate nursing educational requisites about family-integrated care. Galarza-Winton et al. (2013) created the educational classes from information gathered from the literature review, survey results and input from staff and parents with lived experiences of their infant's admission in the NICU. After six months, the program creators assessed the influence of the educational workshop on the nurse's practices of patient and family-centered care. Nurses communicated that the most useful educational material was related to the specificity of nursing obligations versus parental duties, parental lived experiences in the NICU, and developmental care strategies. Additionally, the

participants suggested continued guidance and feedback to optimize nurses' skills for implementing family family-integrated care (Galarza-Winton, 2013).

Nursing Education

Folker-Maglaya et al. (2018) used implementation science strategies with associate degree nursing to increase knowledge and educate nurses earning associate degrees. Additionally, the researchers used an evidence-based breastfeeding toolkit as a training tool to bridge the gap between research and practice (Folker-Maglaya, 2018). The breastfeeding toolkit's efficacy was measured using a pretest/ posttest survey with 60 experimental group participants and 54 control group participants. The control group received a 1-hour postpartum lecture. Educational methods for the experimental group included a prerecorded PowerPoint presentation, educational reenactment scenarios, a mini- movie on self-attachment of the newborn, engaging lecture using illustrations and props (breast model, life-sized doll, and breast pump) (Folker-Maglaya, 2018).

Additionally, the experimental group received a 5-minute presentation with directives using a double electric breast pump, question and answer session, and a case study assessable 24 hours a day (Folker-Maglaya, 2018). Evaluations results indicate that overall knowledge within groups increased for pretest and posttest-survey scores. Additionally, the experimental group had significantly higher score averages for change scores between pretest and posttest. This study demonstrates the benefits of several methods for the translation of knowledge in standard practice as well as follow up support to sustain skills.

Summary of the Literature

Premature infants live in the NICU environment with the potential to be overstimulated or under stimulated, which affects their physiological responses, sensory processing, and

development. The intensity of stimulation affects an infant's stress, performance, and brain maturation. Opportunities for sensory exposure, neurodevelopment care, and play influence infant brain structures. A large body of literature exists supporting practical strategies and clinical recommendations based upon neuroprotective developmentally supportive care (Als, 1986; Griffiths et al., 2019; Milette et al., 2017).

Gee et al., (2018) reported that infant–maternal reciprocity is durable where the quality and incidence of primary and meaningful infant-caregiver connections may continue through nursery school age. Consideration of the infant's health and well-being, state regulation, playful exploration, and caregiver engagement is appreciated when engaging with infants in the NICU. Similarities and contrasts in premature infants' care warrant further investigation to determine the best practices to promote feasible and safe amounts of sensory input and play for development early on and when infants achieve full-term age.

Literature on early intervention and play techniques within the NICU for full-term infants and older infants is limited. However, extensive literature about infant–maternal reciprocity and co- occupations applicable to play and development exists. This program will utilize the principles of patient and family-centered care and implementation science to promote play and sensory-motor development of long-term infants in the NICU.

Chapter Three

Methodology

An overview of Shaping the Lives of Little Ones Developmental Equipment Project and methods of implementation is provided in this chapter. The project's design, structure, and implementation strategies were guided by the Person-Environment-Occupation Model and Implementation Science. Stages and phases of the project, human resources to drive and sustain the project, and cycles to assess outcomes were identified using the Implementation Science framework. Goals were developed to address accomplishments, modify the project to make improvements, and to receive constructive feedback. Multiple preparatory steps were carried out for implementing the project which included securing grant funding, collaborating with stakeholders to develop a successful and sustainable program.

Additionally, chapter three will discuss the development of promotional flyers, nursing pretest and posttests, and education about equipment safety, family education, and program sustainability methods. Nursing pretests, posttests and informal parent discussions served as quantitative and qualitative outcome measures. In addition to the outcomes, this chapter highlights the program's design for meeting goals, objectives, and outcomes.

Shaping the Lives of Little Ones, Developmental Equipment Project

The goals of Shaping the Lives of Little Ones Developmental Equipment Project was designed to provide opportunities for sensory-motor experiences and play for older infants by increasing access to essential equipment and toys for infants' development. Additionally, the project provided opportunities to facilitate occupations of parenting through play, bonding, and increase parents and nurse's knowledge for enhancing infants play and interactions. The project included nursing, staff, and caregiver's education about maximizing play through the infant's

senses to deter the risk of developmental delay. The project's actions encompassed identifying changes in nurses' knowledge, staff training, and updating parent education. The project provided infant swings, chair covers, rattles, developmental toys, mats, bathtubs, mirrors, and mobiles for the infants and families to participate in developmental activities and co-occupations (see Appendix A). The equipment served as staple equipment in each infant's room as a standard of practice to enhance their environment and sensory experiences for sight, hearing, touch, movement, social interaction, and development. The standard set of equipment in each room addressed and helped to solve the obstacles of limited equipment, decreased presence of volunteers who hold, provide touch and socialization for infants. Additionally, Shaping the Lives of Little Ones Developmental Equipment Project enhanced the quality of services and the environment despite the decreased availability of Child Life services in the NICU. Shaping the Lives of Little Ones Developmental Equipment Project will continue to promote engagement, increase occupational performance, and bonding between infants and caregivers. Moreover, Shaping the Lives of Little Ones Developmental Equipment Project may deter the sequela of extended hospitalizations. Two primary approaches steered the project's formation and contributed to sound, practical strategies to create best practices based on research. Research and principles from the Person-Environment and Occupational Model and Implementation Science guided the design of this project.

The Person-Environment-Occupations Model

Occupational performance molded through the relationship of person, environment, and occupation factors, is distinguished in the Person-Environment-Occupations Model (Law et al., 1996). The NICU project focused on the person domains of parents and nurses' roles, parents' self-concept about their ability to perform parenting, and infants' physical performance to engage

in play and sensory experiences for varied ages less than 12 months. The environment domain entailed space for equipment and toys within the larger institution and the infants' immediate physical environment or individual private room. The occupations domain involved tasks that one engages in that are meaningful and fulfilling (Law et., 1996). Examples of occupations of parenting include skin to skin contact, diapering, holding, bathing and play with infants. See Appendix C for an illustrative representation of the PEO Model.

The Person

In the PEO model, the person included parents as the primary caregiver for older infants in the NICU. Caring for infants in the neonatal intensive care unit's overstimulating and atypical environment is a new role for mothers and fathers. The parents' new roles and duties can bring on anxiety and fear about bonding and adequately caring for their infant. Supporting parents to perform their infants' self-care, play with their infants, and parenting occupations is a vital role for Occupational therapists in the NICU.

Primary caregiving of the infants is one of the duties of nurses. Nurses customarily spend at least 12 hours with the infants and structure the day's medical, self-care, or play activities. Play and sensory experiences for older premature infants were facilitated by nurses, after education and training by occupational therapists and other skilled disciplines. Caregivers and nurses influenced infants' contextual environment and the outcomes of infants' occupations.

The Environment

Interventions targeted the environment through physical means (the provision of equipment and toys) social and cultural means (staff and parent education). Visual and auditory stimulation for infant development was provided by MamaRoo infant swings, and mobiles. Additionally, the MamaRoo swings provided soothing vestibular input from rocking, waving,

and kangaroo settings. Developmental toys offered visual and tactile information for infant exploration. Mirrors offered visual stimulation and feedback from the mothers' and infants' reflections and promoted socialization and cause and effect interactions. Bathtubs presented opportunities for water play and sensory exposures to different thermal grades. A spacious area for developmental positioning and tummy time play is offered by infant play mats.

Additionally, staff and parent education about play and sensory experiences and occupational therapy are valuable to the environment. Increased knowledge about play broadened the team's view about the importance and benefits of play. Nurses better understood play and integrated play into infant's daily routines, and hence created a positive culture for play in the NICU. These environmental enhancements provided a spacious area and foundation for the facilitation of occupations and co-occupations.

Occupations

Infants' occupations and interventions are emphasized by play and sensory experiences included reaching and grasping mobiles mounted on cribs and MamaRoos, and tummy time in front of mirrors. Additionally, co-occupations between caregivers and infants included diapering, feeding, and sensory experiences during bath time play. Occupations also provide caregivers with the opportunity to help their children. Through occupational performance, parents develop knowledge and confidence to care for and safely interact with their infants. Additionally, infants learn to explore their environment, bond with caregivers, and grade movements through occupations and play. Implementation science provided a basis for effectively executing a project for infants and caregivers based on research while considering change methods.

Implementation Science

Components of this capstone project are based on the implementation science framework to provide efficient and effective means for staff to employ the Shaping the Lives of Little Ones Developmental Equipment Project in the NICU. Implementation science is a logical examination of methods to alter behavior, promote research into practice, and improve health services and interventions (Eccles & Mittman, 2006). The National Implementation Research Network (2020) outlined the five implementation science frameworks as 1) useable innovations, 2) implementation stages, 3) implementation drivers, 4) implementation cycles, 5) implementation teams to improve health care practices.

Useable Innovations

Interventions should be easy to use and feasible for the setting, and to ensure this, the project coordinator consulted with staff and families throughout the project. Provision of toys and equipment for infant sensory experiences and play are practical innovations for older infants in the NICU. Additionally, educating staff and parents about bonding, the benefits of play, and how to engage infants in play in the infants' accessible individual room are useable innovations. Operational definitions and the program's description, as defined in chapter one, are other applicable useable innovations of the project.

Implementation Stages

Implementing a project is a comprehensive task and requires several phases of development. Exploration, installation, initial implementation, and full implementation are the implementation stages as outline in implementation science (The National Implementation Research Network, 2020). The infants' and the NICU's needs, reasonable practices and

programming for the population and setting were identified in the general assessment (The National Implementation Research Network, 2020).

Exploration Phase. During the exploration stage, the project coordinator explored reasons why older infants were inconsistently engaging in play and sensory experiences while out of the crib. Further exploration entailed determining the NICU's need and what supports were necessary to increase the frequency of increasing infants' and caregivers' engagement in sensory experiences, play, and bonding. Observation, informal conversation with nurses, and interdisciplinary therapists were methods of assessment in the exploration phase. The installation phase consisted of multiple contextual and systematic changes such as developing guides for communication, securing funding, human resources (staff), and purchasing equipment. The grant, champions, and flyers for the project are discussed later in this chapter.

Installation Phase. During the installation phase, the project coordinator informed the stakeholders that toys and equipment would be staple equipment in 25 infant rooms on the unit versus stored in a storage room located on the unit. Additionally, stakeholders determined that phone calls, WebEx meetings, and emails would be the three primary modes of communicating for updates about the project. Additionally, flyers, video presentations, and in-person meetings/trainings were the primary communication modes for nurses and parents about program education. Project supporters who implemented the project, specifically nurses and established project champions were educated and trained about play, sensory experiences, and how to sustain the project during this phase.

Initial Implementation. When initiating the project, the focus was towards training, assessing whether the project was moving as planned and assessing areas needing improvement, solving barriers and obstacles to success. Dr. Bloch, the residency supervisor, purchasing coordinator,

and infection control practitioner assisted in solving barriers for developing educational material, educating staff, purchasing equipment, and adhering to the hospital's infection control guidelines for materials. Additionally, Mothers on the PFAC provided favorable input about the project's concept, benefits to NICU mothers and infants, and the informal post-education discussion questions. Nurse educators and the residency supervisor reviewed and provided feedback for the pretest and posttest, nurses and participants educational video, and educational materials for parents.

Full Implementation. Nurses and interdisciplinary champions will carry out the project with infants and families, to support their needs and opportunities to learn through their senses. This project and staff will provide sensory experiences and opportunities for play for infants between touch times, guided by posted activity schedules in the rooms. Additionally, staff would encourage parents to play with infants, practice parentings skills, and bond with infants. The parent educational video serves to reinforce options for play within the NICU.

Implementation Drivers

Educational videos, hands-on practice, and laminated instructions posted in the infants' rooms enhanced nursing and parents' knowledge about play, equipment and toy use, and ability to carry out interventions. Additionally, posttest education and informal conversations with nurses and parents reinforced the goals of Shaping the Lives of Little Ones Developmental Equipment Project and highlighted changes in nurses and parents' knowledge.

Implementation Teams

Nursing, therapists, leadership, directors, and the project coordinator comprised the implementation team. These members helped to ensure the education and training of staff members, and the outcomes of older infants engaging in play and bonding with caregivers

(Fixzen, 2005; The National Implementation Research Network, 2020). Organizational support for the project was provided by the nursing directors along with the nurse educator. Staff members were educated about play, cleaning and storing of the toys and equipment by the champions (trained therapist and nurses). NICU staff members encouraged the use of toys and equipment and occupational engagement between infants and caregivers. The project coordinator and champions will follow up with participants to answer questions, resolve issues, and support them during the initial and completion phases.

Implementations Cycles

Implementing a project is not linear but moves forward until faced with barriers or obstacles to success. Coordinators and participants may need to study the reasons why a step in the process has failed. Participants may need to revert to plan another approach to meet the project's goals and outcomes. Moreover, implementation is cyclic and may informally or formally go through a plan, do, study, and active process. One major obstacle was that new potential vendors failed to complete the necessary documents to become approved vendors. The leadership did not order equipment and toys for the project from known registered vendors delaying the implementation phase. Additionally, hospital approved vendors did not sell certain toys, swings, and mobiles. Obstacles deterred the anticipated schedule for implementing the Shaping the Lives of Little Ones Developmental Equipment Project to benefit infants and families at the Wasie Neonatal Intensive Care Unit.

The Project Setting

The Wasie Neonatal Intensive Care Unit at Joe DiMaggio Children's Hospital, located in Hollywood, Florida, is the largest in Broward County and serves premature infants in their 84 critical care beds (62 Level III beds, 22 Level II beds). The project's setting includes private

NICU rooms with required medical equipment and general equipment such as open cribs, cabinets, designated areas for family and nursing communication, monitors, televisions, reclining rocker chairs, and sofas for parents and staff to comfortably interact with infants. Additional support is needed to provide equipment and toys, promotional and educational material to institute this project in the NICU setting. Extensive program preparation was needed prior to initiating this exciting project.

Program Preparation

After conceiving the initial idea for Shaping the Lives of Little Ones, the project coordinator researched the project, provided evidence-informed research about the topic, and sought financial support from the community. The research highlighted early intervention and the benefits of play to support the project's purpose and mission. The project coordinator presented the concept to Directors of Inpatient Services, the NICU, and the Joe DiMaggio Children's Hospital Foundation.

Grant

The project coordinator applied for a grant from JDCH Foundation. A project description, nature of the reason for the project, the project's impact, itemized project budget, illustrative pictures of the project's equipment, and toys were included in the grant allocation request. The grant process entailed presentations, meetings, and signature authorization from the Director of Inpatient Rehab Services, the NICU acting Director, followed by the NICU Director. The grant phase also included a PowerPoint presentation and webinar call with the Board of Directors for the Joe DiMaggio Children's Hospital Foundation. The JDCH Foundation granted the NICU \$12,5000 on September 30, 2020.

Meeting with Program Collaborators

When implementing a project or program, it is essential to partner with other organizations and stakeholders to garner buy-in into the project's concept, goals, and implementation. The more groups that support the project, the broader the staff's range to disseminate information and work towards the project's success. The NICU Patient and Family Advisory Council (PFAC) held monthly meetings that the project coordinator attended to keep them informed about the project and obtain feedback. The PFAC were updated on the project's progress and how it aligned with patient and family-centered care approaches. Parents on the PFAC NICU committee provided positive feedback about the project's concept and reaching the audience of nurses, parents, and infants.

Additionally, parents on the NICU committee suggested displaying babies attached to medical lines in the parent's educational video similar to the infants' experience in the NICU. The parents also offered to review project materials geared towards NICU parents. The meetings provide opportunities to collaborate with families, support best practices, and satisfy one of the tenets of patient and family-centered care.

The NICU directors and nurse managers were notified about the project's activities, education, ordering equipment, equipment storage within individual rooms, and the project stages. The nurse educators, infection control practitioners, and the purchasing coordinator of the supply chain were invaluable internal resources. Nurse educators assisted with rolling out the project and devising the best methods to reach most nurses within the unit for education and training. Infection control practitioners advised on proper cleaning and management of toys, mats, mobiles, and bathtubs. Suggestions from infection control practitioners were included in the education video for participants and nurses. The program coordinator summarized the

methods for cleaning mobiles, vinyl mats, bathtubs, and toys which was included in the video and posted in infant's rooms. The purchasing coordinator was central to ordering equipment, ensuring the vendors had met the necessary guidelines to become hospital approved vendors. Communication with stakeholders is one of the critical components for information sharing in a project or program. Communication methods used in Shaping the Lives of Little Ones Developmental Equipment Project included emails, face to face meetings, and virtual WebEx meetings.

Project Dissemination-Flyers

The project coordinator created flyers to inform staff of upcoming dates of the project's rollout, surveys, and dissemination of nursing education material. Canva application provided culturally sensitive photos of infants and caregivers for the use on flyers. Canva is a public domain application to attain photos and video versus the inability to use copyrighted photos. Carlisle (personal communication, October 2, 2020) reported that most photos and videos from Google and Bing are copyrighted unless specified by CC-O. The select pictures provided inclusion of the diverse population within the NICU. The NICU nurse educator helped to disseminate information to staff through emails and posted flyers at the communication boards and conference room. See Appendix D -Flyer to inform nursing and staff about the upcoming project and the rollout month. See Appendices E, F, and G for the nurses' surveys cover page, the introduction of survey topics, and instructions for the survey.

Educational Tools-Videos

A video is a reliable methodology for educating and training. The educational video for nurses provided visuals to illustrate verbal teaching and increased relatability to the topics. Implementation science suggests providing information by several means to support the receiver

remembering the information. Researchers showed that people remember approximately only 10% of what they read, 50% of what people see and hear, and retain about 90% of what people do (Dale, 1946, Jackson, 2016). The educational video for the project was developed through several channels, using Canva, and iMovie.

Canva provided the same open options for photos and videos as stated above and a wider variety of illustrative mediums to explicitly describe sensory experiences and play. Through iMovie, Canva resources were combined with other media to develop the educational video. iMovie also permitted editing the photos, videos, flyer templates, slides and uploading and embedding videos from other sources than Canva. The features mentioned above, coupled with voice over and music, simultaneously created an interesting mini movie to sustain the participant's interest. The program's purpose, goals, and background, and information about infant-caregiver occupations and co-occupations were included in the educational material in the video for Shaping the Lives of Little Ones Developmental Equipment Project. The video discussed occupational therapy's role in the NICU, the importance of sensory experiences and play for infant development. Equipment and toys provided by Joe DiMaggio's Children's Hospital Foundation are highlighted, and details of their purpose, use, cleaning, and storage are provided as outlined by manufacturers, evidence-based literature, input from the NICU directors, purchasing and infection control department. See Appendix H for the link for the nurses' educational video presentation.

Nursing Education

This capstone student found similar quality improvement programs in the literature where nursing education was necessary to implement and sustain the program. Implementing a breastfeeding toolkit for nursing education, safe sleep practices in a neonatal intensive care unit,

implementing family-integrated care in the NICU, and the Supporting and Enhancing NICU Sensory Experiences (SENSE) program outlined effective nursing education methods (Folker-Maglaya et al., 2018; Galarza-Winton et al., 2013; Pineda et al., 2019; Voos et al., 2015).

Educational workshops, videos, training, opportunities to ask questions, and modify strategies for improvements are effective methods for educating nurses and parents in the neonatal intensive care units (Galarza-Winton, 2013). Observation, checklists, surveys, comparisons to set standards are practical approaches to evaluate change and assess nurses' level of learning when educating them about new practices and policies (Voos, 2015; Galarza-Winton, 2013). VanderVeen (2020) recommends training staff to understand the psychosocial needs of parents of preterm infants. Actively listening and responding, providing family-integrated care, providing culturally sensitive care, and peer-to-peer support are effective methods to improve learning (VanderVeen, 2020).

Pretest

The capstone student developed a pretest to determine participants' baseline knowledge about occupational therapy, sensory experiences, and play. The pretest also serves as a post-assessment of changes in participants' knowledge after viewing the video presentation. See Appendix I to view the pretest questions. A pretest-posttest design, educational intervention for staff and parents, and return demonstration of parents' skills engaging with their infants are feasible approaches to increase participants' knowledge (Folker-Maglaya et al., 2018). The purpose of the pretest and posttest is to assess the change in knowledge within a group. The pretest and posttest are discussed further in the analysis section.

Champions

After discussing the project Shaping the Lives of Little Ones Developmental Equipment Project with various staff members, the capstone student informally surveyed various staff members. Several were in favor of the premise, goals and volunteered to assist and support the project in all stages. These stakeholders were nurses, occupational and physical therapists, speech, and language pathologists. Champions' training and responsibilities consisted of testing the survey and viewing the nurses and participants educational videos. Champions' duties included participating in a training session on the management of MamaRoo, mobile, CoverMe disposable covers, mirror, mats, cleaning and storage of toys, and bathtubs (See Appendix J and L for equipment and toy showcase flyer and training checklist).

Additionally, champions were available to support staff use of the above equipment and toys during the project's duration. For sustainability of the project, the champions encouraged and supported parents and nurses for using the equipment, and ongoing after the first month. Champions also assisted in controlling inventory of excess equipment in the designated storage area (CoverMe Disposable covers, rattles, and palm toys).

Participants. All nurses (new hires and seasoned) assigned to the NICU participated in the project. Participants completed pretest and posttests, watched an educational video, attended an educational training, and worked with infants and their families. In collaboration with the nurse educator, the program coordinator facilitated participation in all the phases of the program for the provision of improved services and consistency of care. Parental participation in education and practices for infant sensory experience and play was voluntary. Parental recruitment occurred through posted flyers, disseminating information through the champions,

nurses, and interdisciplinary therapy services. Team champions recruitment occurred through volunteerism from all staff and leadership. Inclusion criteria for infants consisted of full-term infants, who were medically stable enough to tolerate out of bed activity in the swing, on the mat for tummy time, playing in the mirror or with other select toys, and who were approved by the medical team.

The Procedure of the Project

The directors of the neonatal intensive care unit and inpatient services, director of the Doctor of Occupational Therapy Program and capstone mentor at Nova Southeastern University, approved the capstone project's focus of quality improvement in the NICU. The nurses, and leaders who volunteered to serve as team champions implemented and will sustain the Shaping the Lives of Little Ones.

Marilyn Tyre, Dr. OT(Candidate), MPH, OT/L, C/NDT, served as the project coordinator leader. She is a Level II Occupational Therapist for the pediatric rehabilitation unit, pediatric intensive care unit, and neonatal intensive care unit at Joe DiMaggio Children's Hospital. Marilyn has a bachelor's degree in occupational therapy and a certification in neurodevelopmental treatment.

Several design approaches were considered for implementing the Shaping the Lives of Little Ones Developmental Equipment Project. The project coordinator:

- Posted informative flyers about the upcoming project and kick-off for Shaping the Lives of Little Ones Project on the NICU unit bulletin board, parent lounge, parent Facebook, staff email, and Joe DiMaggio Facebook page.

- Distributed pretest and posttests and educational videos through NICU Turning Point applications. Education consisted of defining the role of occupational therapy, occupations, co-occupations, and benefits of play.
- Oriented the nurses about Shaping the Lives of Little Ones project at nurses AM and PM shifts.
- Trained team champions, nurses in a face-to-face in-service and active hands-on training with toys and equipment, covering the use, care and storage and play.
- Posted laminated sample infant activity schedule and cleaning instructions for toys and equipment in infant rooms.
- Informally discussed with parents about the benefits of the play, equipment and toys, and confidence about infant bonding and play. Hosted a debriefing session to gather and summarize feedback to make improvements to the project and support sustainability.
- Tallied and summarize pretest and posttest outcome results, informed the nurse educator, and leadership.

The program's education component included reviewing and modifying current practices, staff education and training, and updating parent education. Education included enhancement of approaches for engaging infants in occupations with their caregivers (parents and nurses).

Parents and staff were reminded to use the infant activity schedules and about the importance of timing and using a schedule to develop infant-caregiver routines. Additionally, nurses and parents were reminded about the occupations and co-occupations to engage throughout the day and week (see Appendix B). The project coordinator and nurse educator, champions reinforced using wish list for families to bring in toys and equipment for infants (Appendix Q).

Safety and Cleaning of Equipment

The project coordinator and infection control practitioner reviewed the safe cleaning policy for management of toys and equipment in the NICU. The program coordinator communicated, updated, and reinforced instructions for cleaning toys and equipment to the staff and parents in the nurses' educational video, and during champion training, and posted in the room for staff and families. See Appendix L-Flyer for Toy and Equipment Showcase for champion's and staff training. See Appendix M-Checklist for training session for champions and nurses. The project coordinator provided a video about proper donning CoverMe covers on infant chairs/swings in the educational presentation.

Family Education

Family education is essential to enhancing sensory experiences for infant play, bonding, and development. Families generally received education at the bedside or in team rounds. This capstone plan was to provide family education through electronic access through a QR code or URL link for smartphones, iPad, or computers. Literature supports the above options for educating families in the NICU. Pineda et al. (2019) describe the utility of a detailed 69-page parent education book that emphasized parent's relevant roles for the infant and strategies to appropriately interpret and respond to infant cues. Moreover, the extensive education booklet was accessible by smartphone, tablet, or computer. This writer synthesized the information and developed feasible education methods to effectively implement the Shaping the Lives of Little Ones Developmental Equipment Project in the Wasie Neonatal Intensive Care Unit.

Sustainability

Shaping the Lives of Little Ones Developmental Equipment Project is a well-received initiative; however, sustainability must be considered. For current and future infants and

families, the mission was to access toys and equipment as staples within infants' rooms to provide opportunities for sensory experiences and play, bonding, and engagement in occupations for development. Implementation drivers and implementation teams mentioned previously are necessary vehicles to assure the sustainability of the initiative. The project coordinator and team champions continue to serve as a support system for trained nurses, resources for parents, and to educate and train new staff via new employee orientation or staff meetings. Moreover, educational presentations are available through the Turning Point application and a shared electronic file. Smartphones are available for new parents admitted to the NICU and as an educational resource for the staff. Moreover, the champions and project coordinator are available for questions or continued education for nurses and families.

Outcome Measures

Outcomes measures for the project are both quantitative and qualitative. Nurses completed pretest and posttest after viewing an educational video about the benefits of play and opportunities for sensory experiences, occupations, and co- occupations for infants and occupational therapy's role within the NICU. When comparing pretest and posttest education responses, results can reveal changes in nurses' baseline knowledge about occupational therapy, sensory experiences, and play. In the NICU PFAC, the following feedback was provided by parents: The ex- NICU parents overall impressions of the educational video about play for full-term infants was favorable. The parents liked the video and thought it would be beneficial for NICU parents. The parent's impression was that the most helpful aspect of the video was that it was comprehensive, covered a lot of areas to help nurses' and parents' understanding about play and sensory experiences (See Appendix K). Additionally, the program coordinator received informal feedback from nurses and champions about all phases of the project. The champions

and project coordinator debriefed about feedback from nursing, parents, leadership, and will make changes and improvements in the project.

Analysis

The project coordinator analyzed outcome measures of pretest and posttest results. The pretest posttest aimed to determine the effectiveness of the educational presentation's influence on changing nurses' knowledge about the benefits of sensory experiences and play, the role of occupational therapy in the NICU, occupations, and co-occupations for infants and their caregivers. A t-test analysis can determine if there are significant changes in pretest to posttest scores.

Summary of Methodology

Shaping the Lives of Little Ones Developmental Equipment project was designed to facilitating sensory experiences, engagement in infant occupations, co-occupations, with parents (including play) This program provided toys, equipment and education to staff and families on the importance of play and sensory experiences. The numerous aims of the project were to provide access to developmental equipment and toys to increase sensory exposure, assist parents and nurses in engaging with infants, and promote development and learning to deter the risk of developmental delay. Researchers informed the reader about several strategies for effective education and training for nurses and parents in the NICU setting (Folker-Maglaya et al., 2018; Galarza-Winton et al., 2013; Pineda et al., 2019; Voos et al., 2015). Educational strategies were not limited to one or two methods, but multiple methods were utilized to grasp concepts and impact learning about the importance of sensory experiences and play for impacting infant's development and infant and parent bonding. Educational presentations, educational resources,

hands-on training, and follow up support appear to be feasible plans for translating knowledge to meet the goals of Shaping the Lives of Little Ones Developmental Equipment Project in the NICU.

Chapter 4

Results and Findings

Shaping the Lives of Little Ones Developmental Equipment Project was scheduled to commence at the beginning of 2021 with the support of evidence-based research, the directors and staff of the neonatal intensive care unit, inpatient rehab services, and Joe DiMaggio Children's Hospital Foundation. However, several obstacles delayed implementation, but initial planning and implementation science methods served as facilitators to execute the beginning phases of the Shaping the Lives of Little Ones Developmental Equipment Project. This chapter discusses the barriers, facilitators, and results of implementing the educational components of the Shaping the Lives of Little Ones Developmental Equipment Project.

Barriers and Facilitators to Program Implementation

Barriers to the Shaping the Lives of Little Ones Developmental Equipment Project included numerous hospital bureaucratic constraints along with communication and Covid-19 concerns. Fortunately, the nurse educator served as a facilitator with her openness for collaboration, communication, and dissemination of information to NICU nurses. Sadly, barriers outweighed facilitators for executing the full realization of the Shaping the Lives of Little Ones Developmental Equipment Project. These concerns will be further described below.

Vendors

Vendor barriers included successful ordering of toys and equipment within the time frame of this current project. This limited nurses, infants, and parents' access and opportunities for using the developmental toys and equipment for sensorimotor experiences and play. There were many institutional constraints encountered that impacted the situation: prohibitions of using

local vendors, effective communication between the hospital purchasing department and manufacturers, and incomplete documentation for determining hospital-approved vendor status.

Unbeknownst to the project coordinator initially, hospital policy prohibited purchasing of toys and equipment from local vendors, despite prices of products and shipping being considerably lower than distant product manufacturers or distributors. Vendor approval by the purchasing department, vetting team, and hospital system were more essential than saving money. Some vendors and manufacturers did not respond to emails vetting their services on time or at all. At times, replies took up to two to four weeks for vague responses such as someone from our company will be in contact in 7 to 10 days, without a response in that time frame. Lastly, the vendors appeared uninterested in submitting customary packets of required forms such as W9-request for taxpayer identification number and certification, vendor template for the credentialing process, sample invoice, and electronic transfer forms (see Appendix N, O, and P).

Moreover, the project coordinator sought to find the primary companies who created or developed the requested infant seats, mirrors, black and white cards, mobiles, mats, and bathtubs. Further research was necessary to seek new companies that sold the developmental toys and equipment to establish a collaborative relationship with Joe DiMaggio Children's Hospital NICU. The project coordinator submitted six companies' names: 4 Moms, Manhattan Toy Company, I-Play I-Learn, Performance Health, Independent Medical Associates, and Sandbox Medical to the purchasing department. The purchasing coordinator telephoned and sent emails to vet the companies and seek admission to the approved vendor's list. The manufacturer and distribution companies did not respond to initial emails by the purchasing coordinator or the project coordinator. Despite communicating through several emails and phone calls by each party weekly to bimonthly, submissions of documents to attain approved hospital vendors status

were markedly delayed. Lacking approved vendor status affected ordering essential toys and equipment for the project and hence delayed project implementation. As of this date, paperwork is still being processed. In addition to vendors and the purchasing department, the infection control department also impacted ordering and delivering equipment and toys.

Infection Control

All toys and equipment must meet infection control guidelines before approved for ordering, purchase, or use in the NICU. The infection control department declined approval for cleaning rattles and bathtubs to use for multiple patients. However, the hospital has a policy with a guided sequence to safely clean toys and equipment for pediatric patients. The project coordinator considered several adaptations to overcome the barriers to using rattles and bathtubs for the Shaping the Lives of Little Ones Developmental Equipment Project. The project was adapted to provide individual rattles for the NICU infants for use during the hospital stay and given to the infants at discharge.

Additionally, the program coordinator collaborated with a local distributor to access bathtubs for single patient use, which the family would receive at discharge. Moreover, the distributor and project coordinator worked together to present the option of using bathtubs for multiple patients with disposable bathtub liners. Currently, the project coordinator is still awaiting a final decision by the infection control representative to use bathtubs in the NICU. However, the infection control representative approved using MamaRoo infant chairs, mobiles mirrors with dual sides black and white cards, and therapeutic mats because they are wipeable and easily cleaned with hospital-approved wipes. Additionally, laundering of the MamaRoo seat should follow the hospital laundering services guidelines and safety policies. CoverMe disposable covers can serve as an additional barrier over the MamaRoo seat while in use with the

infant. Besides working with vendors, purchasing, and infection control, to obtain select toys and equipment for sensory experiences and play, the program coordinator also intended to create an education video with the hospital videographer. The education video would serve to educate nurses and parents about the importance of play occupations, the value of occupational therapy, and infant-parent bonding.

Videography

The capstone student intended to create an education video with the hospital videographer who is typically available for these types of projects. However, the hospital videographer did not return calls and emails to the coordinator to film the educational video about play and sensory experiences for nurses or parents. The project coordinator deemed it necessary to learn the basic skills of videography to create a video. The project coordinator used iMovie for Windows to create a short film about infant play, sensory experiences, tummy time, infant-parent reciprocal play, and infant-parent occupations. iMovie platform provides the creator opportunity to create movies, slideshows, graphics, interface music, and text (movieforwindows.com, 2021). The project coordinator also learned Canva, a graphic design platform, to develop social media graphics, presentations, and posters (Canva.com, 2021). The video served as a training tool to illustrate the importance of infant play and sensory experiences to nurses in the NICU. Shaping the Lives of Little Ones Developmental Equipment Project is an idea that commenced with occupational therapy, infants, and nursing but transformed into a collective approach with the premise to include parent education through media beyond the education provided during therapy sessions.

Parent Video

The project coordinator secured the traditional hospital-approved parent consent forms, obtained parental consent, filmed, edited footage, compiled pictures, and video into applications for presentations and movie videos. The premise of the video was for educating parents about the benefits of play, encouraging them to engage in sensorimotor play and sensory experience with their infant, and supporting them by providing them with practical activities to engage in despite necessary medical tubes and lines. The director of inpatient rehab services thought it was necessary to review the intended use of the videos with the legal department at Joe DiMaggio Children's Hospital. After further review, legal advisement strongly suggested that additional consent forms would be needed to share the video with any stakeholders in the project. By the time of notification, the parents and infants were already discharged from the NICU and would not be easily accessible after the fact. Therefore, the parent video and informal follow-up questions, as discussed in chapter three, were not implemented. If communication between the project coordinator, NICU staff, inpatient services director, and Joe DiMaggio Children's Hospital legal department were more open and transparent, the feasibility of completing a second consent form would have been more likely. Communication is crucial when collaborating with other disciplines or groups to implement projects or programs effectively.

Communication

Communication with the hospital's supply chain purchasing coordinator and nursing educator was imperative for purchasing toys and equipment and educating and training nurses within the NICU. Emails were the communication method generally used to share new updates or requests with the supply chain coordinator, and at times phone calls and messages were unanswered. The supply chain coordinator enlightened the project coordinator that it is

prohibited to purchase items from any other entity than hospital-approved vendors. Additionally, all vendors need to complete W9 forms, vendor templates, and invoices, and be approved through the hospital vetting team. The companies should also provide instructions for use, cleaning, and price quotes. After the above procedures, the supply chain coordinator shall place orders, and await deliveries. The receiving department shall label the items and have the items reviewed and inspected by the biomedical department to receive the stamp of approval for safe use and provide inspections outlined by hospital guides. During the multistep ordering procedures, often the supply chain coordinator's feedback and suggestions, were delayed in response to the project coordinator. The project coordinator persevered and emailed and called vendors and the supply chain coordinator weekly to twice a month to confirm any updates in the ordering process. The supply chain coordinator apologized for her multiple delays in providing feedback and extending the order process. It is currently over 6 months and no orders have been initiated. Although at times, communication with the supply chain coordinator was challenging, communication with the nurse educator was smoother.

The nurse educator was easily accessible by email, telephone, WebEx meetings, and texting. The nurse educator always had her phone available for all forms of communication, but she preferred texting as the primary means of communication. Additionally, fellow nurse educators supported the primary nurse educator and filled in in her absence. The least used method of communication was in-person meetings due to restrictions on gathering in proximity due to Covid-19 (Merriam- Webster.com, 2021). Lack of face-to-face meetings may have affected timely communication and hindered the order process and, as relationship building, and accountability may have been reduced.

Covid-19 Barriers

Covid-19 caused barriers for meeting, educating, and training staff, nursing, champions, and parents. Covid-19 is a highly contagious respiratory illness that manifests with slight to seriously fatal symptoms or can be asymptomatic (Merriam-Webster.com, 2021). The Coronavirus causes Covid-19, which spreads by transferring the virus through respiratory droplets or on surfaces, placing individuals at risk of contracting the virus, possibly resulting in fever, coughs, breathing issues, respiratory failure, and death (Merriam-Webster.com, 2021). CDC and hospital guidelines required staff members to wear personal protective equipment (PPE) and to maintain a social distance of at least 6 feet apart when meeting face to face. Initially, the hospital restricted both parents from visiting infants, then one parent was allowed per day, which progressed to two-parents per day, but not simultaneously. Parents were available for traditional education and training during therapy sessions about sensory experiences and play.

Moreover, the hospital discontinued volunteer services to the NICU to date. Nurse managers modified morning and evening communication huddles to follow social distancing guidelines. The project coordinator for Shaping the Lives of Little Ones Developmental Equipment Project accommodated a maximum of 4 people per training session during the toy and equipment showcase which was held in an infant's room. During the training session, staff followed social distancing and frequent hand hygiene practices. On average, three or fewer staff members attended a session. If it were not for restrictions, more staff could have been trained at one scheduled time. Before Covid-19, at the least 10 -12 staff members could comfortably attend and participate in the showcase in the same setting or up to approximately 20 in the NICU conference room. Covid-19 caused stress locally and globally due to its high risk for contraction. Stress amongst nurses, champions may have increased secondary to Covid-19, impacting usual

workloads, participation in the showcase for Shaping the Lives of Little Ones Developmental Equipment Project. The current nurse educator (Ms. M) helped arrange education, location, schedule education while considering guidelines for social distancing and gathering data.

Nurse Educators

The NICU director initially referred the project coordinator to a nurse educator (Ms. C) working remotely from another state. The project coordinator contacted the nurse educator via email but did not receive a response for nearly 2 ½ weeks. The initial nurse educator's availability and services were not the ideal fit for working on the Shaping the lives of Little Ones Developmental Equipment Project. The project coordinator was then directed to another nurse educator who works at Joe DiMaggio Children's Hospital physical location, who became the main point person. Better coordination of collaborative partners would have helped to work with the nurse educator to implement the Shaping the Lives of Little Ones Developmental Equipment Project. The new nurse educator (Ms. M) was helpful with disseminating information about Shaping the Lives of Little Ones Developmental Equipment Project to nursing staff. The nurse educator assisted with formatting and distributing pretests and posttests and the educational video through an application called Turning Point. The pretest, educational video, and posttest were scheduled for nursing staff to complete over three weeks. The nurse educator compiled the staff responses in an excel spreadsheet for interpretation which will be discussed in the survey results area. The nurse educator secured a location for the toy and equipment showcase and hands-on education. In addition to changes in collaborative partners and recognizing the equipment order issue, another option was planned to obtain toys and equipment, the parent wish list.

Wish List

The project coordinator developed a wish list for families to include toys and equipment to foster play and sensorimotor development of infants. The wish list was posted in infants' rooms as a visual reminder to request parents to bring toys and equipment to assist infants with play and sensory experiences until items arrived for the Shaping the Lives of Little Ones Developmental Equipment Project. The wish list consists of small toys and equipment such as crinkly toys, play and kick pianos, Boppy pillows, wrist rattles, music boxes, mirrors, infant ring toys, mobiles, and infant play mats (see Appendix Q). Nurses, champions, and therapists shall refer to the wish list when encouraging caregivers to bring in sensory items and play with their infants. The wish list was a project modification to communicate project needs, support nurses and caregivers in incorporating play and sensory experiences into NICU infants' routines.

Project Recruitment

Project Information

Emails, nursing communication boards, and flyers posted in the conference room served as initial methods to disseminate information about the project and its rollout. Additional methods to disseminate information about the project included making announcements at nursing huddles, team rounds, and posting flyers by the nurses' time clocks. Informal methods of communication include chatting with the neonatologist, clinical managers, and charge nurses. Flyers, emails, networking, and word of mouth were supportive methods to recruit nurses to participate in all aspects of the Shaping the Lives of Little of Developmental Equipment Project (surveys, view the educational video, and share information with parents).

Project Participants and Attendance

The program participants remained the same as previously outlined, including NICU nurses, interdisciplinary champions, occupational therapists, physical therapists, and parents of infants in the NICU. The inclusion criteria for Shaping the Lives of Little Ones Developmental Equipment Project was infants 40 weeks and older and their caregivers with prolonged hospital stay in the neonatal intensive care unit.

New and experienced nurses were informed about the program by the project coordinator and the nurse educator through emails, flyers, and verbal communication. The nurse educator suggested a best practice method for communicating with the nurses is through a familiar platform called Turning Point. The original method to disseminate information was to send pretest and posttest through survey monkey via a QR code and watch the educational video through a link provided in an email blast. The nurse educator devised one practical method to access all three educational components versus several. The project coordinator recruited project

champions through a volunteer basis from staff who expressed eagerness to participate in the project or who demonstrated passion about engaging infants with their caregivers and would agree to the responsibilities of a Champion. Two hundred and fifty nurses received the surveys and education through Turning Point. A group of twenty level two and three nurses was selected to be participants in a pretest and posttest for analysis through a t-test comparison or other indicated examination. A t-test comparison helps determine the significance of changes in knowledge about play, sensory experiences, and occupational therapy. An additional thirty-seven nurses completed the surveys.

Project Dissemination

Pretest-Educational Video-Posttest. Flyers were emailed and posted on the unit to notify them about the pretests and posttests. Initial plans to distribute the pretest and posttest were via a QR code linked to Survey Monkey. The educational video was to be sent via a separate QR code link. However, program alterations included distributing the information via emails and an education platform that nurses customarily use, called Turning Point. NICU nurses were emailed a 10-question pretest about basic knowledge of play and sensory experiences with a three-week timeframe for completing it. Nurses were encouraged to complete the survey by the nurse educator and the project coordinator. Nurses could access the surveys and video on the hospital computer or personal phones and enter responses.

Pretest and Posttest Results. Ninety-five percent of nursing staff responded they are extremely likely to use developmental toys to engage infants in sensory experiences if available on the unit or infants' rooms during the pretest. In the posttest likelihood of use increased to 100% of the nurses. This section highlights the analysis of changes in nurses' knowledge after viewing an educational video about infant play and sensory experiences, and the role of occupational therapy in the NICU. Twenty nurses completed a pretest and posttest related to the educational video. A paired *t*-test was conducted to see if there was a difference in pretest and posttest scores. Pretests mean score was 76 (SD= 3.35), posttests mean score was 89.5 , (SD= 3.11). A paired *t*- test was conducted with a difference noted between pretests and posttests scores $t(19)=-4.9, p < .05$. A significant statistical difference was noted in pretests and posttests scores.

The results indicate improved knowledge after viewing the educational video about play, sensory experiences, and occupational therapy. Translation of knowledge and learning occurs using several methods to teach the learner. The most effective method for learning is doing, above seeing, or reading (Dale, 1946; Jackson, 2016). Therefore, an additional hands-on training session was hosted for nurses to review, practice, and implement components highlighted in the educational video.

Education Program Implementation

A toy and equipment showcase was hosted on February 22, from 2:30 PM to 11:00 PM, for champions, day, and night shift nurses. Staff learned of the showcase through email blasts, huddles, word of mouth, and flyers. The flyer advertised the showcase to commence at 5 PM for nurses. However, education and hands-on training for the champions began earlier that afternoon with discussion and reconfirming their duties and responsibilities. The showcase was scheduled

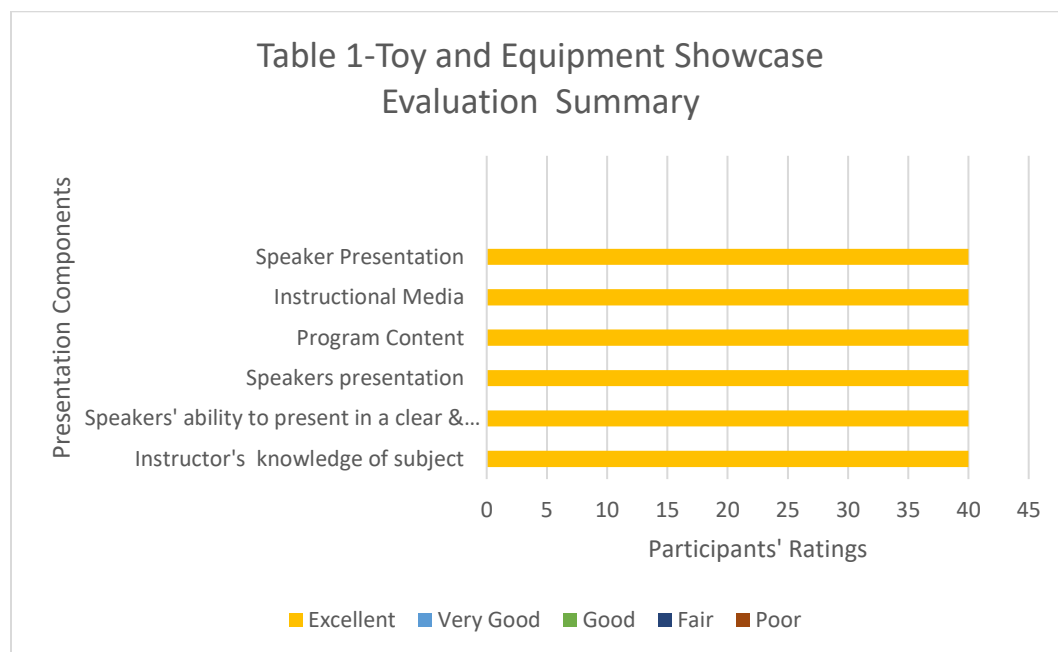
to occur for one day with thoughts of leaving the room staged for one week so staff could peruse through the room in a museum-style format. However, the showcase schedule altered from the initial plan, and details are discussed in the scheduled change section.

The showcase was held in an infant's room with staged dolls with infant chairs with disposable covers, cribs, mats, mirrors, rattles contrast cards, mobiles, and bathtubs. The infant dolls were staged in various positions (on their back, stomach, and sides) to simulate the variant positions for play and sensory experiences. These dolls had clothing, blankets, and several medical lines attached to them to simulate the appearance of NICU infants (See Appendix R- Education Implementation Photos). The project coordinator reviewed toy and equipment use of all items. The project coordinator also highlighted the various opportunities for sensory experiences, and play through sight, sound, touch, movement, and temperature. Additionally, parameters for cleaning, infection control, and storage of items within the infants' room were reviewed. Nurses had the opportunity and were encouraged to practice positioning the infants for play in the Boppy pillow, on the mat, and in the chair. Obtaining bathtubs at Joe DiMaggio Children's Hospital is not yet approved through the infection control department. The project coordinator spoke to the likelihood of purchasing and using bathtubs in the NICU in the future. Additionally, the project coordinator verbally reviewed the use and cleaning of bathtubs for a single patient with soap and water or multiple patients with protective disposable liners. Approximately sixty staff members attended these sessions, however about ten participants were pulled away to deliver babies, attend a meeting, address parents' needs, and missed out on the tokens of appreciation.

Results and Feedback of the Education Implementation

The facilitator showed appreciation for the participants by providing individual wrapped, decorative peanut butter cookies with Reese’s candies and chocolate cookies. Participants also received a badge buddy that served as a reward and conversation piece to inform others that participants were helping to shape the lives of little ones. The badge buddies were raised 3D stickers with a single rhinestone in the shape of colorful onesies, infant bottles, small flowers, infant rattles (See Appendix S-Tokens of Appreciation). Participants received an eight-question evaluation form to provide feedback to the project coordinator about the training.

Over 50% of participants (37 out of 51) completed the evaluation form following the showcase presentation (see Table 1). Evaluation topics included: instructor’s knowledge of the subject, speakers’ ability to present in a clear and organized manner, speaker presentation, program content, instructional media, and facility environment. Thirty-seven participants provided a rating of excellent on all questions (on an ordinal rating scale from excellent, very good, good, fair, and poor).



Program evaluation summaries included three open-ended qualitative questions. This section provides thematic responses to the evaluator's open-ended questions.

1. How will you be able to use this information on the job? Thematic responses included daily, for infant development, developmental care, improve quality of infants' lives, help older infants' skills, growth, positioning, and play with babies with bronchopulmonary dysplasia and neonatal abstinence syndrome.
2. What improvement would you recommend? Themed responses included none; the bathtubs; more of the same equipment in the NICU; bathtub liners; hug tags; alarms locators for the MamaRoo infant chairs; methods to assure nurses place the washable MamaRoo seats in the proper bin for laundering; MamaRoo chairs and Boppy pillows for all private infant rooms; a designated bin for MamaRoo covers separate from other laundered items. Provide a therapy bin in the NICU storage area to store rattles, covers to prevent inadvertent overuse and waste.
3. What was the most beneficial aspects of the program? Various survey responses included visual and explanations about the products; getting familiar with the available toys and products, ideas for bonding and play; the entire presentation; keeping the toys and equipment in the individual rooms to reduce chances of getting lost; the positive interactions the babies will have with their environment; demonstration and visualization of the actual equipment; instruction, demonstration, and actual practice with the items. Additional survey comments included learning new things to do with the toys and equipment; infant chairs; chair covers; and bathtubs; to know that staff will be doing good things for the older babies; everything is beneficial, how to support infants across their development; and Marilyn is amazing. (See Appendix T- Program Evaluation Summaries).

Program Procedures Modifications

A few variations in the procedures of the program were implemented after re-evaluating the process and considering the numerous barriers. Initially, sharing information about the program on the Parent Facebook page and JDCH Facebook page was entertained. After further consideration, sharing the information after the project was up and running and sustainable was a more appropriate modification for communicating project information.

The original program design called for one month of implementation with toys and equipment following staff education. Due to the inability to obtain the toys and equipment for reasons previously reported, the education components were employed, specifically the pretest, educational video, posttest, and interactive face-to-face educational training with nurses. A respiratory therapist (RT) invited himself to the educational in-service, found it interesting, and asked why he was not invited. The project coordinator briefly considered the RT concerns and invited him to the in-service. Four other respiratory therapists followed suit and attended the hands-on training, which was initially intended only for nursing. Practical in-services and educational videos were great methods to disseminate information, educate and integrate information for the staff. Initial program procedures included educating the parent via a video about play sensory experiences and opportunities for occupations and bonding via an accessible QR code.

After the educational video for nurses was completed, and the projector coordinator was well into completing the parent video, the hospital's legal department halted the use of infant photos and videos. The legal department indicated that additional parent consent forms were necessary to use the footage for education, a study, or public distribution. Project champions and developmental therapists will educate parents about play and sensory experiences when

providing infant care, during therapy sessions, and when the toys and equipment arrive in the future.

Recurring educational in-services were scheduled from 3 to 11:00 PM on Monday, February 22, 2021 for the toy and equipment showcase. Each in-service varied from 20 to 30 minutes, depending on the participant's knowledge. The maximum capacity of each in-service was three people due to social distancing recommendations due to COVID-19. The interactive in-service provided an opportunity to train and engage champions and ensured hands-on opportunity to manipulate the MamaRoo infant chairs, sound, and motion controls, donning and doff disposable chair covers, apply wipeable mobiles, mirrors, and black card to the cribs. Additionally, participants experiences included positioning bathtubs on stable surfaces, simulating applying of bathtub liners, exploring different style rattles, cleaning toys and equipment with hospital approved wipes. The showcase was held in a NICU infant's room to feel the flow of arranging, cleaning, and storing the toys and equipment, versus staged simulation in a conference room. Champions were trained and signed off before nurses or respiratory therapists. The infant's room remained set up for the next day for staff members to peruse through the room, review and apply instructions and concepts from the educational video. The program coordinator created instructional placards to post at each station for nurses to read and learn from throughout the week. The showcase room included a standard infant chair, a MamaRoo with a disposable cover, a crib with a mobile and Boppy pillow, two mats on the floor with mirrors. Other items in the showcase included a standing black and white laminated cards and mirrors, instructions covering play opportunities, practical uses, cleaning, and storage. Each station also had a clothed baby doll with a tracheotomy tube, continuous positive airway pressure oxygen line, nasal

canula, pulse oximetry line, cardiopulmonary electrodes, and pacifier simulating what a real NICU baby may require.

Education Schedule Changes

To the program coordinator's surprise, the toy and equipment in service and showcase were announced in the morning huddles to reoccur on the second day (Tuesday). Changes in the education schedule was not communicated to the project coordinator. The original plan was to do the showcase for the entire day for all staff and leave the room available during the week for staff to practice. Miscommunications occurred and nurses were under the impression that additional education sessions would be held that day. To better serve the nursing staff, the program coordinator conducted three more sessions (on Tuesday, Thursday, and Friday evening). A total of four education sessions were provided to meet nurses' needs.

Additionally, the educational video created for the nurses was playing in the background during the showcase and available for reference. The staff was excited about the project, learning about play, sensory experiences, toys, and equipment to provide infants and caregivers access and opportunities. However, the most frequently asked questions were concerning the grant funding and equipment arrival timeline.

Purchasing Equipment

No toys or equipment have been purchased due to communication barriers from vendors and the supply chain coordinator, incomplete application process to become hospital approved vendors, which hinders obtaining the director's signatures to initiate an order. Surprisingly, money is not a barrier after grant approval in September 2020 for \$12,500. The supply chain coordinator suggests that the project coordinator be proactive and complete purchasing order forms for each company and their respective toys or equipment item (See Appendix U). The

completed forms will need the director's signatures after the vetting team approves the companies. After ordering through Joe DiMaggio Children's Hospital, the companies will process the order, complete their paperwork for delivery. Delivery can take a minimum of four weeks to six weeks for large orders. Once the toys and equipment that require power/electricity are delivered, they will need inspecting and inspection stickers by the biomedical department. All toys and equipment except rattles will need labeling, for example, the property of NICU, or do not remove from NICU Room E1. Labeling will deter parents from removing items upon discharge or losing equipment when taken for cleaning. The project coordinator has been tenaciously working on equipment orders since the inception of the grant in September 2020.

Summary of Results and Findings

Results from the educational components of the Shaping the Lives of Little Ones Developmental Equipment Project are favorable. The pretest-and posttest results demonstrated a statistically significant increase in knowledge of nurses, following the educational video. Staff responses were extremely likely for using developmental toys, from 95 to 100% during the pretest and posttests. Additionally, staff members rated the project coordinator's training techniques, knowledge, and presentation with the highest marks. Multiple bureaucratic barriers hindered the full implementation of the project, specifically communication, fulfilling documentation responsibilities for vendor status, and duties for implementing the purchasing process. The project coordinator continues to communicate with the vendors to facilitate the purchase of required toys and equipment for this project.

Chapter 5

Discussion

Literature supports the value of play and sensory experiences for enhancing infants and child development (Dusing et al., 2018; Griffiths et al., 2019). Infants should justly have the opportunities and an environment with access to toys and equipment to enhance development, play occupations, and infant and parent bonding. Parent involvement in the care of infants promotes bonding, brain growth, and supports infant-parent relationships. Occupational therapists play a significant role in nurturing parental occupations facilitating sensory experiences, and play in the NICU (AOTA, 2018; Orton et al., 2018). Occupations are quintessential to building skill and competence. Play provides several benefits for infant language and social development, physical, motor, and cognitive development and learning through unstructured experiences (Barnekow et al., 2012; Pizur-Barnekow, 2014; Price, 2009; Yogman, 2018). NICU staff members and nursing should understand the benefits of play and infant development to promote skill development and deter developmental delay. Various barriers and enablers shaped the nursing educational component and full implementation of Shaping the Lives of Little Ones Developmental Equipment Project. This chapter discusses strengths, limitations, alternative implementation strategies, methods for replication, and sustainability of the Shaping the Lives of Little Ones Developmental Equipment Project. Strategies for education, research, and project dissemination are also reviewed.

Furthermore, staff's knowledge about play and sensory experiences is essential to providing infants' opportunities and access to toys and equipment to support development and play occupations. Literature supports the use of implementation science principles, patient and

family-centered care, educational media, and training workshops to enhance nurses' knowledge about interventions within the NICU (Galarza-Winton al., 2013).

Implementation Science for Motivating Change

The capstone student hypothesized that increasing staff knowledge about play, typical development and occupational therapy will empower staff to enhance parental occupations. Additionally, providing infants' and parents' access to toys and equipment will increase opportunities for play and enhance bonding for full-term infants and their caregivers. The COM-B theory of behavior change in implementation science highlights that individuals need capability, opportunity, and motivation to change before change can occur (*Inspiring change 2.0.*, 2021). NICU nurses' capacity increased through skill-building through an educational video and practice showcase experience provided. Nurses' opportunities for change include a plan for changing the environment with toys and equipment for each infant's room and supportive resources. Social influences would include elite status of nurses (who participated in training) and marketability to the community and NICU moms for serving the community with new advanced toys and equipment. Nurses received a badge buddy (in the shape of infant rattles, onesie, bottles, or flowers) indicating completion of the training. The badge buddy serves as an initiator of conversation about the staff's role in the Shaping the Lives of Little Ones Developmental Equipment project (*Inspiring change 2.0.*, 2021). Motivating factors for change include the nurses' beliefs about their capabilities, completion of hands-on training, and competencies for use, storage, and cleaning of toys and equipment provided at the showcase.

Implementation Science and Nursing Education

There is a body of literature about using implementation science in successful nursing education program execution in the NICU (Galarza-Winton et al., 2013; Folker-Maglaya et al., 2018). Literature supports using principles of implementation science as effective methods for developing, implementing, and evaluating nursing education workshops (*Inspiring change 2.0.*, 2021; National Implementation Research Network, 2020). The pretest, educational video, posttest, toy and equipment showcase, and training were framed around the principles of implementation science. Galarza-Winton et al. (2013) used implementation science strategies to survey nurses' fundamental knowledge, create workshops, gather feedback about the workshops, and collect staff and parent input about NICU experiences to establish family-integrated care in the NICU. Folker-Maglaya et al. (2018) used implementation science strategies to educate and increase nurses' knowledge about breastfeeding using a research evidence-based breastfeeding toolkit in conjunction with standard education. The 54 participants in the control group received standard education via a 1-hour postpartum lecture. The 60 experimental group participants received a prerecorded PowerPoint presentation, educational reenactment scenarios, a mini movie on self-attachment of the newborn, engaging lecture using illustrations and props (breast model, life-sized doll, and breast pump). Additional education included a brief presentation instructing the use of a double electric breast pump, a case study, and opportunities to ask questions and receive feedback (Folker-Maglaya, 2018). Researchers assessed the efficacy of the breastfeeding toolkit using a pretest/posttest survey. Although the knowledge of each group increased, the experimental group had significantly higher score averages for scores for knowledge change scores between pretest and posttest. This capstone project adds to the previous literature demonstrating the benefit of implementation science principles for nursing

education.. Staff members may be knowledgeable, capable, motivated, and have opportunities for positive change, but other issues may arise that impede the implementation cycle.

Implementation Stage

The implementation stage was held up by cumbersome hospital procedural requirements (vendor status, media consents, availability of the media specialist). The project coordinator revisited the project's implementation phase concepts of do, study, and active process. Upon reflection, feasible strategies to move forward in the project were considered. Constructs of person, environment, and occupation of the PEO Model which hindered implementation were revisited. Alternate routes for implementing the project were explored.

The PEO Model and Implementation Science

The environmental context had factors that impeded the success of implementing the project's educational components. Social distancing safety constraints for Covid-19, restricted education for large groups in department meetings, in-services, and conference rooms. Additionally, the environment limited attendance to the toy and equipment showcase to a maximum of three to four people at a time. Nurses may have been deterred from attending during available break time, which conflicted with the available times to attend the showcases designed for small groups. Moreover, parents are less available for education due to restrictive guidelines for the number of outside visitors to the hospital. Small groups were less effective for education as it required the project coordinator to implement education and training more often.

The project coordinator was presented with an unexpected request to educate and train three additional times for the toy and equipment showcase. The project coordinator and nurse educator agreed upon approximately 8 hours to educate and train champions and nurses working the AM and PM shifts. Several showcases and training were carried out over a week after the

project coordinator's regular work schedule. However, a more feasible and productive option would have been to record the showcase to use with large groups. Recording the showcase presentation would allow numerous nurses to watch the recording independently without time constraints and learn basic toy and equipment usage, cleaning, and storage. The assessable video recording would reduce some of the time-consuming duties required of the project coordinator.

The social context posed challenges for project implementation as the project was time-consuming for one person to write a grant, create and coordinate education and fulfill the multiple occupations of a project coordinator (Law et al., 1996). Project implementation also called for coordinating preparatory steps for ordering equipment, contacting, and corresponding with potential vendors and existing vendors, the purchasing department, infection control department, nurse educator, leadership of inpatient services, and the neonatal intensive care unit. The project is labor-intensive and required the project coordinator to assume various roles and changes in roles, from clinician to capstone student.

The project coordinator hypothesized that many of the duties and issues might have been diffused if solely working in the role of a clinician. The clinician may have received more support as an equal paid peer than a student. Most tasks and duties were required to be performed after work hours. Recommendations for duplicating this project and future projects are negotiating allotted time to work on the project during work schedule, including duties and salary for an administrative assistant into the grant to support the project, specifically, taking charge of ordering and following through on equipment ordering with vendors and purchasing personnel. Shaping the Lives of Little Ones Developmental Equipment Project appeared straightforward on the surface but revealed multiple complex layers and duties for consideration before full implementation.

Project Strengths

The project was created to bridge the gap between older NICU infants' reduced opportunities for play and sensory experiences, access to developmental equipment and toys, and infant-caregiver bonding. Project strengths included successful collaborations, populations, occupational performance, and resources.

Collaborations

Implementing the Shaping the Lives of Little Ones Developmental Equipment Project was more effective with supportive collaboration with the NICU nurse educator. The nurse educator was familiar with successful implementation strategies for communicating with the AM and PM nursing staff. Additionally, the nurse educator suggested using technology platforms that the NICU nurses had already been trained on (emails and Turning Point) versus introducing new applications of Survey Monkey and QR codes. Without the nurse educator's collaborative assistance, the project coordinator would not have access to communicate to the entire nursing staff, advertise the project, schedule training, or coordinate pretests and posttests, and gather results. Interprofessional collaboration with other disciplines and services (purchasing, infection control department, therapies, nursing, leaders) contributed new ideas and insight to meet the goals of the project and effectively serve the infants and their families..

Populations

The NICU is implementing several projects simultaneously on the unit to serve the infant population. The criteria for the program Supporting and Enhancing NICU Sensory Experiences (SENSE) program helps to define the criteria for the Shaping the Lives of Little Ones Developmental Equipment Project. The inclusion criteria for the project is full-term infants over 40 weeks who have or will have prolonged hospital stays. The SENSE program defines

prescribed daily amounts of sensory exposure for infants from 23 weeks to 40 weeks through sight, hearing, smell, touch, and movement. The distinct population for each project prevents competing interests or staff confusion about engaging infants and caregivers in the project.

Occupational Performance

Hands-on training or doing has positive implications for increasing knowledge and improving practice of skills. Fisher (2014) describes effective interventions as occupation-focused, occupation-based, and occupation as central to intervention. The premise of educating nurses via an engaging illustrative video coupled with practical training with actual toys and equipment was used to maximize nurses' capacity for learning and increasing knowledge. People remember approximately 90% of what they do, which is more effective than reading (10%), seeing, and hearing (50%) about practice skills. The education and training process in the Shaping the Lives of Little Ones Developmental Equipment Project provides a means for nurses to enhance their overall skills to serve infants through play and sensory experiences. The occupational performance of nursing staff is enhanced through doing, being, and becoming as they take on new roles to facilitate play and sensory experiences of their patients (Law et al., 1996; Wilcock, 1998). Nurses' roles include providing medical care, supporting, and educating parents, and structuring the environmental context and infants' occupations (Law et al., 1996). The Shaping the Lives of Little Ones Developmental Equipment Project provided the opportunity to expand the nursing role with salient information about the critical role of play and sensory experiences in infant development, bonding with parents, and the role of occupational therapy (Wilcock, 1998; *Inspiring change 2.0.*, 2021).

After nurses participated in education through an educational video and training at the toy and equipment showcase, they provided feedback through pretests and posttests and project

evaluations summaries. After the educational video, nurses expressed a better understanding of the benefits of play and sensory experiences and occupational therapy services. The *t*-test analysis showed statistically significant results from pretest to posttest. Nurses' most frequent responses on the project evaluation summaries were the opportunity to use new information to promote older infants' skills and development and improve infants' lives. Additionally, nurses provided feedback regarding their improved capabilities through demonstration, verbal and visual instruction, and actual practice with the toys and equipment. The components of the toy and equipment showcase were meaningful to the nurses' daily occupations and resulted in improved nurses' capacities. The ability to physically touch and practice with the toys and equipment fulfill and supports the concept of doing (Wilcock, 1998).

Resources

The Patient and Family Advisory Council (PFAC) and mentor were significant strengths to this project. The project mentor, Dr. Elise Bloch was a knowledgeable and accessible resource for the project who guided the project coordinator in designing and implementing the project based on theories and evidence from the literature. Former–NICU mothers serving on the PFAC suggested targeting nurses, mothers, and fathers for education. Former NICU moms also recommended using educational tools (video, pictures), including babies with medical lines like those needed by NICU babies.

Furthermore, mothers serving on the PFAC offered to review and constructively critique and provide suggestions for any education directed towards NICU parents. NICU Moms also suggested preferences for care for other NICU moms based on their lived experiences. The members of PFAC were open and receptive to actively collaborate with the project coordinator to assist in shaping education and services for infants and families to receive the care they need

(Frampton et al., 2017; Institute of Patient and Family-Centered Care, 2020). Collaborating with families to improve care systems is considered best patient and family-centered care practice (Institute of Patient and Family-Centered Care, 2020). The PFAC and the project mentor were essential in guiding and framing the project. However, there were numerous limitations that hindered the full execution of this project.

Project Limitations

Shaping the Lives of Little Ones Developmental Equipment Project was obstructed by several limitations, including interdepartmental communication, restrictions for safety due to COVID- 19, timeline delays, time demands for multiple collaborations. Several limitations impeded the implementation of the interactive components of the project where champions, therapists, and nurses support the occupational aspect of infants engaging in play and sensory experiences, age-appropriate toys, and equipment.

Communication

Communication between potential vendors and the supply coordinator was less than ideal. At times, several weeks passed before sales representatives responded to calls, emails about the completion of standard vendor templates, W9 forms, and purchase orders. The project coordinator consistently followed up with reminder calls and emails as the supply chain coordinator vetted vendors to become approved vendors within the hospital system. Follow-up may have been impacted by decreased accountability with emails and phone calls versus in-person meetings and collaboration. Covid -19 impacted in-person meetings with local vendors, supply chain coordinator, and nursing.

Covid-19

COVID-19 negatively influences the frequency of hosting nurse education during the toy and equipment showcase. Covid-19 limited accessibility of the Turtle Tub bathtub representative hosting onsite nurse and staff training. However, the representative availed himself for training via Zoom once a business relationship was established with NICU leadership. Educational in-services were hosted more often due to the limitation of the number of nurses accommodated at one session. Although total attendance appeared high at the showcases, it may have been higher with fewer restrictions about staff proximity, essential cleaning, hand washing, and use of personal protective equipment. However, Covid-19 provided new opportunities for education via WebEx, YouTube, and Zoom applications to accommodate large groups. However, the media applications would have limited the valuable concepts of doing and hands-on training for the learning experience. In an effectiveness study, Roza (2021) reported that integrating Zoom and YouTube are effective for educating in small classes and groups. Future considerations for project education are to have several small infant rooms set up for doing and training with champions using one large media application interface, Zoom, for the project coordinator to facilitate the education. Use of media applications may deter some time delays in project education and implementation, but not all.

Time Delays

Time delays of several weeks between the education, training, ordering, and receiving equipment hindered the flow of the project. Nurses are at risk of experiencing a disconnect between education and the value of infant play, sensory experiences in the practical lab, and when actual items are available on the unit. After the toys and equipment are delivered, the items will still need to be labeled to deter them from being removed from infant rooms or off the unit.

Considering all the steps required for project implementation, nurses may need a review of the concepts of the project for optimal execution. The project coordinator and champions will need to bridge the gap and support nursing staff if lapses in knowledge or processes for using, cleaning, storing items, and infant play are evident. Shaping the Lives of Little Ones Developmental Equipment Project is a collaborative effort with several entities.

Time Demands for Multiple Collaborations

Collaborating partnerships can require much time for developing and implementing a project (Doll, 2010; McDavid, 2019). Collaboration is the best practice when developing a project or program to gather input from experts, vested stakeholders, and people to know the needs of the community of interest (Doll, 2010; McDavid, 2019). Collaborating with the nurse educator, infection control, NICU leadership, vendors, and purchasing department provided expertise and essential resources for the project. However, collaborating with multiple stakeholders slowed the project down. As the project expanded and the number of partnerships increased, so did the checks and balances and time demand. A positive response or approval from one project partner led to checking for approval from another. For example, NICU leadership approved purchasing bathtubs with or without liners for multiple patients or single patient use, which required the infection control department approvals and updates to NICU leadership, nurse educator, vendor, and purchasing department via phone calls or emails. The project coordinator also faced challenges with time due to working full time in occupational therapy with daily requirements for productivity. The biggest challenges were trying to call, email, and very briefly meet with partners to coordinate the project and follow up on pending tasks. The project coordinator was instructed to work on the project after work hours, but the most significant barrier was that partners were not available after work. Time constraints and

Covid-19 hindered some individual face-to-face interactions while meeting. However, WebEx meetings are feasible for discussion and decision-making and decreases the challenge of coordinating multiple staff schedules. Revisiting phases of implementation to determine barriers versus facilitators and how to overcome them leads to different methods to carry out processes and meet project goals.

Alternative Project Implementation Strategies

Brainstorming for approaches to solve problems is necessary to overcome obstacles that lie in the path of success for a project. The project coordinator and NICU director addressed the barrier of limited hospital-approved vendors and the marked delay in returning the necessary documentation to the supply chain coordinator. The supply coordinator and JDCH Foundation representative proposed that the project coordinator or NICU Director purchase the items valued at over \$12,000 and be reimbursed later. The proposed suggestion was not feasible in the personal budgets of either stakeholder. Donors were considered to purchase and supplement toys and equipment until the items arrived. For example, Child Life Services, PFAC possible donation, and external donors during the holiday, were considered for seeking donations. The strategies did not come to fruition; Child Life reported that they do not have enough items to provide beyond the BPD infants. The project coordinator created a toy and equipment wish list to post in infant rooms, previously mentioned in the results chapter. The project coordinator will continue to follow up on status of equipment orders with the purchasing department; these toys and equipment are vital for the sustainability of this project.

Project Sustainability

Project sustainability is an indicator of accomplishment and prefaced by project replication. A project must have a built-in mechanism to keep it going even when the coordinator

is not present on vacation or rotated out of the NICU due to other job demands. The projects' pretest and posttest and educational videos about sensory experience and play could be used as required education for new nurses working in the NICU. Additionally, photos and video excerpts from the tools and equipment showcase could also provide training for learning safe usage, cleaning, and storing toys and equipment for the project. Moreover, the two education tools could serve as refresher education for competencies. Covid-19 also influences project sustainability. Previously the presence of volunteers was more prevalent in the NICU. When and if visitation restrictions are lifted, volunteers can be educated on providing sensory experiences while holding the infant, for example, using a mirror or rattles. Lastly, periodic debriefing with champions could keep the project as the primary focus of staff and improve project processes and education.

Education

Participants and stakeholders must be educated about the Shaping the Lives of Little Ones Developmental Equipment Project for effective implementation. Additional education allows modification of the project according to the changing needs of the participants.

Methods for future education include filming an occupation therapy session with a caregiver or nurse posing as a parent, obtaining the newly required parental consent form to film parents and infants in play. Accessible means for providing education that can be explored are YouTube uploaded videos, files in the employee shared drive or the parents' hospital channel. Feedback about educational experiences could prove beneficial for program enhancement and sustainability.

Implication for Research

Future implications for research after implementing the Shaping the Lives of Little Ones Development Project would be exciting to explore. What are the experiences of families, and nurses involved in the project? Considering a qualitative study, the project coordinator may explore nurses' and parents' impressions of using the toys and equipment for older infants in the NICU. Research questions to investigate include: Do the nurses and parents feel the toys and equipment helped promote bonding between infants and parents? Exploring changes in parents' level of self-efficacy for performing parenting and play after participating in the project? This project was designed as a quality improvement project for the unit, therefore implications for practice are considered next.

Implications for Practice

NICU mothers on the Patient and Family Advisory Council can support new NICU mothers in their journey. Additionally, parent advisors can assist occupational therapy in promoting parents' skills and achieving skilled occupations. Parent advisors can share their lived experiences and expertise to help shape and diminish the overwhelming NICU experience. Parental involvement in the care of infants is best practice and supports the tenets of patient and family-centered care, and yields better outcomes for infants (Davidson et al., 2017). The obvious implication for practices is increased opportunity for infant play and sensory experiences through sight, sound, touch, and movement with caregivers in and out of the crib, in infant swings, and on mats. Changing the infants' context and environment can nurture development and occupational performance (Law et al., 1996). Moreover, infants and caregivers can establish new routines and habits, incorporate sensory experiences, and play as part of a daily routine, and influence occupations. Routines can be guided by schedules with windows of

opportunity to engage in sensory experiences and play. It behooves this writer to share beneficial information about the pitfalls, successes of the project with others to learn about project development and implementation to meet the needs of older infants.

Dissemination Plan

Several feasible options lend themselves to methods to share project information with immediate peers and colleagues. This writer plans to provide project information to peers via in-services about the project and/or the grant writing process. Additionally, writing an article for a hospital newsletter, OT Practice, or a poster presentation are applicable methods to disseminate information to stakeholders and a larger body of clinicians.

Conclusion

Shaping the Lives of Little Ones Developmental Equipment Project is a feasible, potentially effective quality improvement project to enhance nurses' knowledge, provide infants with access and opportunity for sensory experiences, and promote parent bonding and performance of occupations. However, limitations impeded successful and complete implementation. Survey results indicated that nurses had a statically significant change in knowledge on the posttests after reviewing the education video about play, sensory experiences, and occupational therapy. The project is comprehensive and provides nurses with a means for education, the opportunity for applying education principles using infant toys and equipment, changes in the infant's room (environment), habits, and routines. The COM-B theory and PEO Model were conceptual theories that guided this project. However, alternative implementation strategies were investigated to support timelier and more feasible project execution. Additional strategies and time are needed to effectively implement the practical aspects of the project. Following full project implementation, the effectiveness of providing access to toys and

opportunity for play, and parents efficacy for performing the co-occupation of play should be considered. Dissemination of information about the project goals, design, changes in nurses' knowledge will be shared with the interdisciplinary team of the NICU, rehabilitation team, and the OT community.

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Appendix A: Developmental Equipment



**Mama Roo Infant Chairs
covers**



Cover Me Disposable Infant Swing & Seat



Manhattan Toy Wimmer-Ferguson Infant Stim-Mobile for Cribs



Floor gym mats



Primo Euro Infant Bathtubs

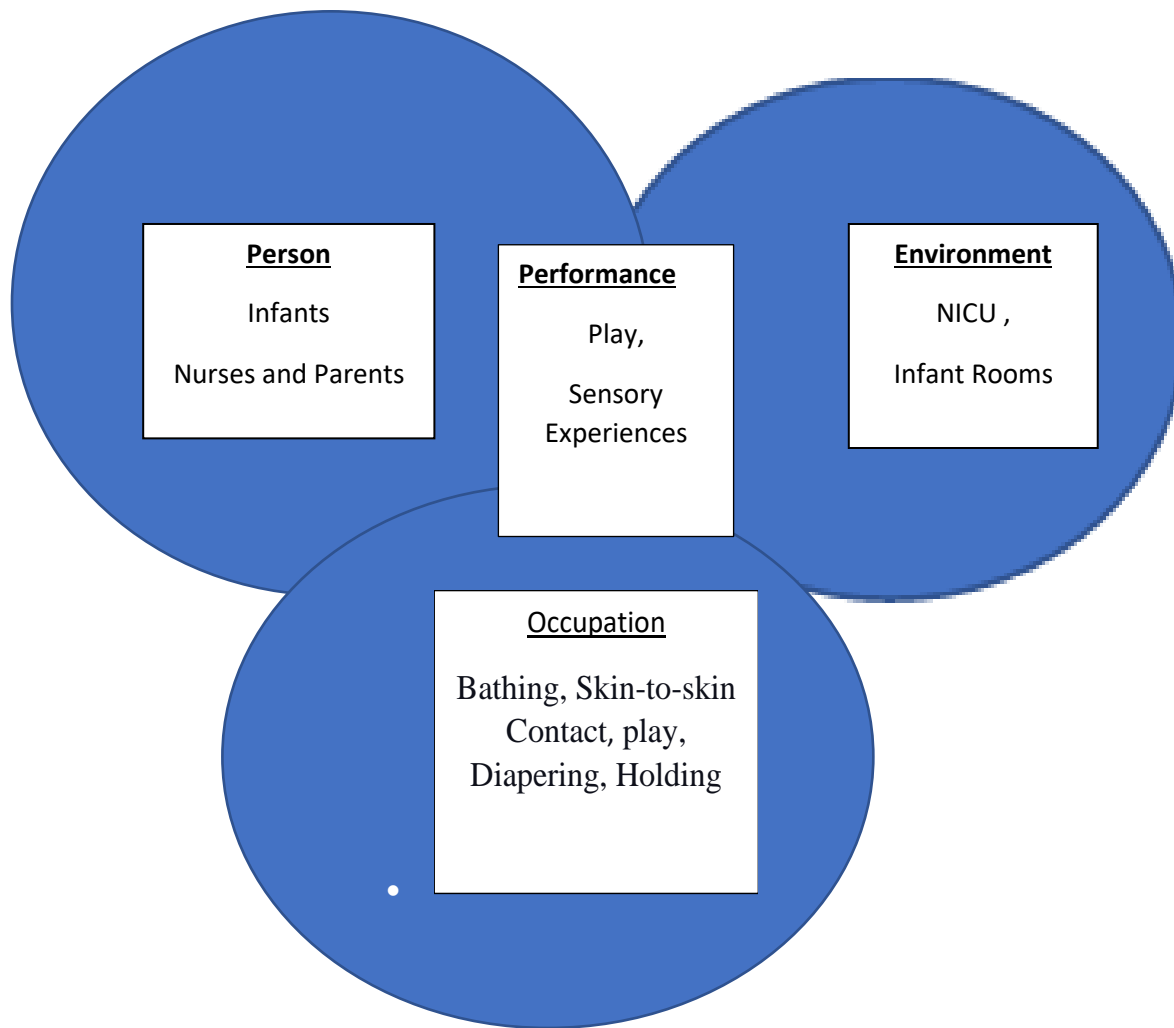


I learn- I Play Rattles



Munchkin Toys

2:30	Rattle-Squeak toy	Rattle-Squeak toy	Rattle-Squeak toy	Rattle-Squeak toy	Rattle-Squeak toy	
3:00	Sleep	Sleep	Sleep	Sleep	Sleep	
3:30						
4:00						
4:30	Touch Time	Touch Time	Touch Time	Touch Time	Touch Time	
5:00	Feeding	Feeding	Feeding	Feeding	Feeding	
5:30	Tummy time-mat	Bath time	Tummy time-mat	Bath time	Tummy time-mat	
6:00	Sleep	Sleep	Sleep	Sleep	Sleep	
6:30						
7:00						
7:30						

Appendix C: The Person-Environment-Occupation Model

Appendix D- Flyer- Project Notification

COMING DECEMBER 2020

Shaping the Lives of Little Ones



A project for infants,
parents and staff

To increase access to
equipment and
opportunities for play and
sensory experiences for
full-term infants and older
infants.

Equipment sponsored by
Joe DiMaggio Children's
Hospital Foundation




Appendix E- Cover Page for Nurses Pretest-Posttest

Shaping the Lives of Little Ones

A project to provide sensory experiences and play for our hospitalized infants



Appendix F- Page 2- Introduction of Pretest-Posttest Topics

Occupational therapists provide continued support for full-term infants and older infants and their families while they remain hospitalized in the NICU. We are interested in your level of knowledge about occupational therapy, sensory experiences, and play for supporting full-term infants and their families.

Appendix G- Page 3 for Nursing Pretest-Posttest

Please complete the survey questions before and after viewing the educational video about sensory experiences and opportunities to shape the lives of little ones.



Scan QR code to begin



Appendix H- Education Video for Nurses and Champions



Video, Shaping the
Lives of Little Ones, 1

Shaping the Lives of Little Ones



Marilyn Tyre OT/L, MPH



Appendix I- Project Participants Pretest- Posttest

Survey-Shaping the Lives of Little Ones at the Wasie Neonatal Intensive Care Unit

Joe DiMaggio Children's Hospital

Occupational Therapists at the Wasie Neonatal Intensive Care Unit provide sensory experiences and opportunities for infants to engage in activities to promote development and decrease further risk of developmental delay. Occupational therapists provide continued support for full term infants and older infants and their families while they remain hospitalized in the NICU. We are interested in your level of knowledge about occupational therapy, sensory experiences, and play for supporting full term infants and their families.

Please take a few moments to answer a few survey questions **before** and **after** viewing an educational PowerPoint presentation on sensory experiences and opportunities to shape the lives of little ones.



Scan QR code to start the brief survey.



<https://www.surveymonkey.com/r/J2NR8FD>

1. How likely is it that you would use developmental equipment/ toys to engage infants in sensory experiences if available on the unit or in the infant's rooms ?
 - A. Extremely Unlikely
 - B. Unlikely
 - C. Neutral
 - D. Likely
 - E. Extremely Likely

2. Which of the following are examples of why full-term infants do not engage in play and sensory experiences in the NICU ?
 - A. Lack of toys and activities within the infant's rooms.
 - B. Parents are not available to interact with the infants.
 - C. Lack of infant chairs and swings within the infant's rooms

- D. Decreased number of volunteer auxiliary workers and Child Life services to hold, interact, and play with infants.
 - E. All of the above
3. Which of the following best describes the benefits of positive sensory/play experiences for infants?
- A. Improved brain development, sleep disruption
 - B. Unstable heart rate, rapid breathing
 - C. Improved brain development, improved visual skills, motor control, and strength
 - D. Temperature instability, startle response
 - E. All of the above
4. Which of the following best describes the meaning of occupation?
- A. Activities routinely performed that are meaningful to the person and consume an enormous amount of time.
 - B. Everyday activities that people do as individuals, in families, and with communities to occupy time and bring meaning and purpose to life
 - C. Activities one engages in that have a monetary return
 - D. All of the above
5. Do babies have occupations?
- A. Yes
 - B. No

6. What role does occupational therapy play in the NICU?
- A. Provide infant massage and splinting
 - B. Provide assessments of infant's function and development, and treatment
 - C. Support infant and parent bonding and participation in occupations and daily living activities (feeding, bathing, sleeping, and play skills)
 - D. Provide recommendations for sensory processing and to enhance positioning infants' hands and arms at the midline.
 - E. All of the above
7. Which of the following are examples of co-occupations between infants and their parent/nurse?
- A. Kangaroo care, bathing, feeding
 - B. Diapering, dressing
 - C. Talking, reading, face to face interaction
 - D. Reaching, smiling, playing
 - E. All of the above
8. Which of the following best describes the benefits of sensory experiences and infant play?
- A. Promotes physical and motor development, develops language and social skills, develops, safe and supportive relationships, increases stress, and improves brain function


- B. Develops language and social skills, develops unsafe and maladaptive relationships, promotes physical and motor development, manages stress, and improves brain function
 - C. Develops safe and supportive relationships, manages stress, and improves brain function, develops language and social skills, promotes physical and motor development
 - D. Manages stress and improves brain function, develops language and social skills, delays physical and motor development, develops safe and supportive relationships
 - E. All of the above
9. Which of the following describes positive results and experiences from tummy time?
- A. Reduced flattening of the back of the head
 - B. Improved head, neck, shoulder, arm, and trunk strength
 - C. Hand grasp and reaching
 - D. All the above
10. Which of the following best describes possible results from reading to infants or using a mirror or a mobile to engage infants?
- A. Reaching, touching
 - B. Visually attending, smiling
 - C. Playful cooing, moving legs and arms
 - D. All of the above

Thank you for participating in this brief survey. After viewing them, the educational PowerPoint or video **please complete the post-education survey.**

Thank you for helping us assess if we are effectively providing education to increase knowledge to team members who strive to shape the lives of little ones.

Appendix J- Cleaning Instructions for Equipment and Toys

Shaping the Lives of Little Ones, Cleaning Instructions

	<p>MamaRoo Swing- machine wash fabric seat</p>		<p>Infant Mobile- wipe with the hospital approved wipes</p>
<p>CoverMe Disposable Covers- spot clean small areas with soap and water, only discard when excessively soiled</p>		<p>Floormat-clean with the hospital approved wipes, air dry for one minute before reuse</p>	

Shaping the Lives of Little Ones; Cleaning Instructions

	<p>Palm sized toys- clean with soap and water</p>		<p>Bathtub- clean with soap and water</p>
<p>Rattles- clean with soap and water</p>		<p>Mirror- clean with the hospital approved wipes, air dry for one minute</p>	

Appendix J. Continued-Cleaning Instructions for Equipment and Toys

- Machine wash MamaRoo fabrics seats and mobile balls after the infants' discharged or when excessively soiled.
- Wipe plastic mobile arms and bases with hospital approved wipes.
- Spot clean small areas on the CoverMe disposable covers with soap and water may be necessary when the cover becomes mildly soiled.
- Dispose of the CoverMe when excessively soiled.
- Clean floor mats, mobiles, and mirrors with hospital-approved wipes during the hospital stay and after infants' discharge.
- Allow the floor mats, mobiles, and mirrors and allow to dry for 1 minute after cleaning, before reusing, or storing.
- Clean floor mats, mobiles, and mirrors during the hospital stay and upon the infant's discharge. Clean rattles and bathtubs with soap and water.

Appendix K- Informal Parent Discussion

Shaping the Lives of Little Ones Informal Parent Discussion



**WHAT IS YOUR IMPRESSION OF THE
EDUCATIONAL VIDEO ABOUT PLAY AND
SENSORY EXPERIENCES FOR FULL TERM
INFANTS?**

**DID YOU FEEL THE VIDEO WAS
BENEFICIAL FOR PROMOTIING
BONDING WITH YOUR INFANT?**

**WHAT WAS THE MOST HELPFUL
INFORMATION FROM THE VIDEO?**

Appendix L- Flyer for Toy and Equipment Showcase

Shaping the Lives of Little Ones

Toys and equipment sponsored by
Joe DiMaggio Children's
Hospital Foundation

A project for infants, parents, and staff to increase access to toys and equipment, opportunities for play and sensory experiences, and bonding for full-term infants and caregivers.



Scan QR code below for education related to the "Shaping the Lives of Little Ones" project. Presented by Marilyn Tyre OT/L, MPH



Equipment & Toy Showcase
Presented by
Marilyn Tyre OT/L, MPH
Monday February 22nd 2021
5:00pm to 10:00pm
Room # to be posted day of
by time clock bulletin board
(Experience should take no longer than 20 min)



Appendix M- Checklist for Staff Training Sessions

Shaping the Lives of Little Ones Checklist

Name: _____
Occupation: _____

Shaping the Lives of Little Ones is a project for infants, parents, and staff to increase access to toys and equipment, opportunities for play and sensory experiences, and bonding for full-term infants and caregivers.

☐ Goals and Objectives

The program's goals are to provide opportunities for caregivers, including nurses and infants, to engage in sensory-motor experiences, developmental activities, and play to facilitate infant-parent bonding, using equipment and toys to prevent developmental delays.

The program's objectives are to increase the knowledge and competency of nurses, parents, and therapists in the Neonatal Intensive Care Unit about play and sensory experiences. The program seeks to promote parental engagement and infant-parent bonding.

- Participants will be familiar with the program's goals, objectives, benefits, and opportunities of play and sensory experiences, toy and equipment use, cleaning, storage, and safety.

☐ Benefits of Play and Sensory Experiences

develops safe and supportive relationships,
improves brain function and visual skills; develops language and social skills,
promotes physical and motor development, motor control, and strength,
develops infant-parent bonding, and manages the stress of the infant and parent

☐ MamaRoo Swings

Uses and play opportunities:

Provides opportunities for learning language (babbling, cooing), imitating expressions (smiling), moving arms and legs, and watching and reaching for mobile parts.

The MamaRoo decreases stress and soothes infants through bouncing, swaying, and sound.

The swing is used with infants less than 25 pounds, and who are not independent sitters.

Participant plugs in swing and adjusts back height.

Adjust five motion settings and speed

Adjust four sounds and volume

Detach mobile arm and mobile parts

Secure infant in the 3 point harness fastener

Cleaning:

Clean plastic parts with hospital approved wipes

Clean cloth parts (seat & mobile parts) by laundering in a washing machine (follow hospital guidelines).



Storage:

Store the MamaRoo on the floor near an accessible outlet for charging the unit. The cord should not obstruct walking pathways.

(4Moms, 2020)

Shaping the Lives of Little Ones



CoverMe Disposable Covers

Uses:

- Single patient use
- Swaddling and rocking infants in swings with 3 point harnesses.
- Staff may use covers for the infant's length of stay if the cover is not compromised.
- The cover prevents cross contaminations between infants, adheres to infection control policies.
- Participant places protective Coverme disposable cover on MamaRoo swing and secures all fasteners.

Storage:

- Covers remain on the MamaRoo. New covers are stored in the clean utility room if necessary. Use sparingly.

Cleaning:

Dispose of the covers when the fabric is excessively soiled.

(Sandboxmedical, 2020)

Infant Mirrors and Contrast Pictures



Uses and play opportunities:

- Used in cribs, or on play mats with full term infants.
- Provides opportunities for visual play, visual attention, scanning, visual development, self-discovery, babbling, smiling, learning caregivers' faces, and imitating caregivers' expressions.

Cleaning:

- Wipe with hospital approved wipes, air dry for 1 minute before reuse.

Storage:

- May secure the mirror and contrast pictures on the crib, or store in the infant's cabinet.

(Manhattantoy.com, 2020)



Infant Stim Mobile

Uses and play opportunities:

- Provides opportunities for visual play, cooing, babbling, reaching, and kicking.
- Contrast-colored circular disc promotes visual attention, scanning, and development.
- Full term infants until infants are able to reach and touch/pull the mobile.
- Caregiver attaches mobile to infant crib.
- Caregiver interchanges contrast disc from simple to more complex.
- Caregiver adjusts cord length and distance from infant to mobile.

Cleaning:

- Clean plastic disc and mobile with soap and water. If discs are excessively soiled, wipe with hospital approved wipes, air dry for 1 minute before reuse.

Storage:

- Attach mobile on the sides of the crib. Store mobile in the cabinet in the infants' room.

(Manhattantoy.com, 2020)

Shaping the Lives of Little Ones



Bathtubs

Uses and play opportunities:

- Bathing and bathtubs provide opportunities for sensory experiences through temperature, touch (skin and fabrics), and movement (water play), sound (of the water/caregiver talking).
- May use bathtubs with full term infants, **reserve bath basins for preterm infants.**
- The maximum size is: Crown-to-rump measurement is 15 inches (38cm) or total length approximately 23 inches (58 cm).
- Tubs used for single patient use for infant hygiene.
- Use tubs with liners for multiple patients use.
- Set up the tub on a stable, level surface.

Cleaning:

- Single patient use- Wash the tub with soap and water, dry, store covered.
- Multiple patient use- discard water and liner, wipe tub inside and out with hospital approved wipes, air dry.

Storage:

- Store tub covered in the cabinet in the infant's room until ready for use.

(Catapult Products, LLC., 2020)



Vinyl Play Mats

Uses and play opportunities:

- Opportunity for sensory experiences, play with the infants lying on their back, sides, and stomach (tummy time).
- Opportunities for infants to explore their fingers and body parts, kick, stretch, and reach. Cause and effect toys, rattles, music, and parents' faces help the infant improve head and neck control, strengthen the arms, back, roll, and facilitate visual social and language skills while playing in different positions.
- Place a blanket on the floor between the mat and the floor, making for easier cleanup.

Cleaning:

- Wipe with hospital approved wipes. Air-dry the mats for 1 minute before reuse.

Storage:

- Fold and store the mat in the infant's cabinet or lean against a wall out of walking pathways.



Rattles and Palm Toys

Uses and play opportunities:

- Provides infants the opportunity to grasp, reach, create cause and effect(shaking the rattle), bringing the rattle towards the middle to mouth it.
- Infants playfully follow rattles with their eyes from side to side and the center. Rattles are also useful to develop language, social skills, and taking turns in play.
- Rattles are useful tools for play and sensory experiences through sight, sound, touch in side-lying, supine, and prone or lying on the sides.

Clean:

- Clean with soap and water.

Storage:

- Infant cabinet or drawers in the infant's rooms. Upon baby's discharge, rattle can be brought home.

(iPlay iLearn Toys, 2020).

Shaping the Lives of Little Ones



Safety During Play and Sensory Experiences

- Adhere to post-surgical orders
- Supervise infants during play, do not leave them unattended.
- Do not leave toys or equipment in the infant cribs when sleeping.
- Monitor for infant's signs of stress or fatigue.
- Avoid excessive neck flexion during play (i.e., MamaRoo swing, mat, crib).
- Place the infant on their backs if they fall asleep while playing.
- Test the bath water temperature before submerging the infant in the tub.
- Replace bathtub after one year of use.
- Adhere to instructions for the use of Coverme disposable covers and bathtub covers.

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Appendix N- W-9 FormForm **W-9****Identification Number and Certification Request for Taxpayer Give****Form to the**

(Rev. October 2018)

requester. Do not

Department of the Treasury

send to the IRS.Internal Revenue Service ☐ **Go to *www.irs.gov/FormW9* for instructions and the latest information.**

1 Name (as shown on your income tax return). Name is required on this line; do not leave this line blank. ☐ ☐ ☐ ☐ ☐

2 Business name/disregarded entity name, if different from above _____

3 Check appropriate box for federal tax classification of the person whose name is entered on line 1. Check only **one** of the **4** Exemptions (codes apply only to following seven boxes. certain entities, not individuals; see instructions on page 3):

Individual/sole proprietor or C Corporation ☐ S Corporation ☐ Partnership ☐ Trust/estate ☐

single-member LLC ☐ Exempt payee code (if any)

Limited liability company. Enter the tax classification (C=C corporation, S=S corporation, P=Partnership) ☐

Note: Check the appropriate box in the line above for the tax classification of the single-member owner. Do not check Exemption from FATCA reporting ☐

☐ LLC if the LLC is classified as a single-member LLC that is disregarded

from the owner unless the owner of the LLC is another LLC that is **not** disregarded from the owner for U.S. federal tax purposes. Otherwise, a single-member LLC that code (if any) is disregarded from the owner should check the appropriate box for the tax classification of its owner.

Other (see instructions) ☐ (Applies to accounts maintained outside the U.S.)

5 Address (number, street, and apt. or suite no.) See instructions. Requester's name and address (optional)

6 City, state, and ZIP code

7 List account number(s) here (optional)

Part I Taxpayer Identification Number (TIN)

Enter your TIN in the appropriate box. The TIN provided must match the name given on line 1 to avoid **Social security number** backup withholding. For individuals, this is generally your social security number (SSN). However, for a resident alien, sole proprietor, or disregarded entity, see the instructions for Part I, later. For other – – entities, it is your employer identification number (EIN). If you do not have a number, see *How to get a TIN*, later.

or

Note: If the account is in more than one name, see the instructions for line 1. Also see *What Name and Number To Give the Requester* for guidelines on whose number to enter.

Employer identification number

–

Part II Certification

Under penalties of perjury, I certify that:

1. The number shown on this form is my correct taxpayer identification number (or I am waiting for a number to be issued to me); and
2. I am not subject to backup withholding because: (a) I am exempt from backup withholding, or (b) I have not been notified by the Internal Revenue Service (IRS) that I am subject to backup withholding as a result of a failure to report all interest or dividends, or (c) the IRS has notified me that I am no longer subject to backup withholding; and
3. I am a U.S. citizen or other U.S. person (defined below); and
4. The FATCA code(s) entered on this form (if any) indicating that I am exempt from FATCA reporting is correct.

Certification instructions. You must cross out item 2 above if you have been notified by the IRS that you are currently subject to backup withholding because you have failed to report all interest and dividends on your tax return. For real estate transactions, item 2 does not apply. For mortgage interest paid, acquisition or abandonment of secured property, cancellation of debt, contributions to an individual retirement arrangement (IRA), and generally, payments other than interest and dividends, you are not required to sign the certification, but you must provide your correct TIN. See the instructions for Part II, later.

Appendix O-Vendor Template for Credentialling Process

PLEASE COPY AND PASTE THE ENTIRE TEMPLATE BELOW INTO AN EMAIL TO BE SENT TO VENDOR. INCLUDE A CURRENT VERSION OF THE W9

Good [Morning/Afternoon],

Memorial Healthcare System requires all prospective and existing vendors to undergo a credentialing process prior to engagement or re-engagement. The information below is required to initiate the vendor credentialing process.

Please complete **all fields** below (do not leave any fields blank) and provide a current sample invoice and a current W9 (Oct 2018 version).

If you have any questions, please contact me.

<i>What specific product/service will you be providing to MHS?</i>	
<i>Sales Contact Information</i>	Name:
	Phone:
	Email:
<i>Finance Representative Contact Information:</i>	Name:
	Phone:
	Email:
<i>How much do you anticipate billing Memorial Healthcare System over 12 months?</i> <i>What are you Payment Net Terms? 10, 15, 30 Days?</i> <i>Do you accept EFT Payments? If so, please complete attached EFT form.</i> <i>If MHS does not pay you, please indicate "[COMPANY/INDIVIDUAL NAME] will not receive payment from MHS."</i>	

<p><i>Will MHS make payment to the: Legal Name, DBA Name, or Trade Name?</i></p> <p><i>If MHS does not pay you, please indicate “[COMPANY/INDIVIDUAL NAME] will not receive payment from MHS.”</i></p>	
<p><i>Will an FEIN or SSN be used for payment?</i></p> <p><i>If MHS does not pay you, please indicate “MHS will not pay [FEIN] or [SSN]”</i></p>	
<p><i>What is the FEIN or last 4 of SSN MHS should make payment to?</i></p> <p><i>If MHS does not pay you, please indicate “MHS will not pay [FEIN] or [SSN]”</i></p>	
<p><i>What are the payment terms?</i> (MHS Standard is net 30)</p> <p><i>If MHS does not pay you, please indicate “[COMPANY/INDIVIDUAL NAME] will not receive payment from MHS.”</i></p>	
<p><i>Will the frequency of service or goods provided over 12 months be One Time or On-Going?</i></p>	
<p><i>Do you accept EFT payments?</i></p> <p><i>If MHS does not pay you, please indicate “[COMPANY/INDIVIDUAL NAME] will not receive payment from MHS.”</i></p>	
<p><i>What type of Purchase Order do you accept: EDI, Email or Fax, N/A?</i></p> <p><i>If MHS does not pay you, please indicate “[COMPANY/INDIVIDUAL NAME] will not receive payment from MHS.”</i></p>	

<p><i>What type of invoice do you send: EDI, Email, Paper (Mail), or Fax?</i></p> <p><i>If MHS does not pay you, please indicate “[COMPANY/INDIVIDUAL NAME] will not receive payment from MHS.”</i></p>															
<p><i>Do you accept Third Party Freight Account? If no, please detail freight terms.</i></p>															
<p><i>Will vendor have access to Protected Health Information (PHI)?</i></p> <p>Protected Health Information (“PHI”) is individually identifiable health information held or transmitted by a covered entity or its business associate, in any form or medium, whether electronic, on paper, or oral that can be used to identify a patient whether living or deceased that relates to the patient’s past, present, or future physical or mental health or condition, including healthcare services provided and payment for those services.</p> <p>If any of the PHI elements listed below are stored in a system for which vendor is requesting access, respond YES to having access to PHI regardless of whether vendor intends to access, use, or disclose that PHI element.</p> <table> <tr> <td><u>HIPAA IDENTIFIERS</u></td> <td><u>CLINICAL INFORMATION</u></td> </tr> <tr> <td>Name</td> <td>Diagnosis/Condition</td> </tr> <tr> <td>Postal address</td> <td>Lab Results</td> </tr> <tr> <td>All elements of dates except year</td> <td>Medication</td> </tr> <tr> <td>Telephone Number</td> <td>Other Treatment Information</td> </tr> <tr> <td>Email Address</td> <td></td> </tr> <tr> <td>URL Address</td> <td></td> </tr> </table>	<u>HIPAA IDENTIFIERS</u>	<u>CLINICAL INFORMATION</u>	Name	Diagnosis/Condition	Postal address	Lab Results	All elements of dates except year	Medication	Telephone Number	Other Treatment Information	Email Address		URL Address		
<u>HIPAA IDENTIFIERS</u>	<u>CLINICAL INFORMATION</u>														
Name	Diagnosis/Condition														
Postal address	Lab Results														
All elements of dates except year	Medication														
Telephone Number	Other Treatment Information														
Email Address															
URL Address															

IP Address Social Security Number Account Number License Number Fax Number Medical Record Number Health Plan Number Beneficiary Number Device Identifier Vehicle Identifiers Biometric Identifiers Pictures Any unique identifying number, code, or characteristic	
<i>Will vendor have access to Personally Identifiable Information (PII)?</i> Personally Identifiable Information (“PII”), as used in information security and privacy laws, is information that can be used on its own or with other information to identify, contact, or locate a single person, or to identify an individual in context	
<i>Contact Information for Authorized Representative for Privacy/Compliance Matters</i> <i>NOTE: If answered <u>NO</u> to accessing PHI/PII, please list N/A in contact info fields</i>	
<i>Name</i>	
<i>Department/Position</i>	
<i>Email</i>	
<i>Phone + ext</i>	

<i>Mailing Address for Privacy/Compliance Matters</i>	
<i>City</i>	
<i>State</i>	
<i>Zip code</i>	

Appendix P-Sample Invoice and Electronic Transfer Form

Support Services / Accounts Payable Department | PO Box
269001 / Pembroke Pines FL 33026-9001 Office (954) 276-5783/
Fax (954) 276-0783

Electronic Funds Transfer Form
(EFT, ACH, Direct Deposit)

Payee (Vendor) Information***Name:**

Tax ID/SSN #:**Address:**

DUNS #:
(Dun &
Bradstreet
Number)

***City/ST/ Zip:**

*** Required Field*****Contact:**

Phone: ()**E-mail:**

Fax: ()
)

Financial Institution Information**** (OR SEND A VOIDED CHECK)*****Bank Name:**

Bank Address:

City/ST/Zip:

***ABA/ACH Routing #**

***Account#**

--	--	--	--	--	--	--	--	--

--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

***Company Authorization** _____

Authorized Signature *Date for EFT/ACH Transfer* _____
Title

MHS Internal Use Only

Entered by: _____ Date: _____

AP Use Only

Vendor #: _____

☐ Updated Lawson

Appendix Q- Wish List

Shaping the Lives of Little Ones

A project for infants, parents, and staff to increase access to toys and equipment, opportunities for play and sensory experiences, and bonding for full-term infants and caregivers.



Wish List

(Items that parents can provide to help their infant's development)

Infant chairs or swings
mobile, bathtub
rattle, crinkle toy, ring toy
black & white pictures
mat, kick and play piano

Parents should consult with their developmental therapist or health care professional to determine if their infant is ready to use the items on the wish list



Appendix R- Education Implementation Photos

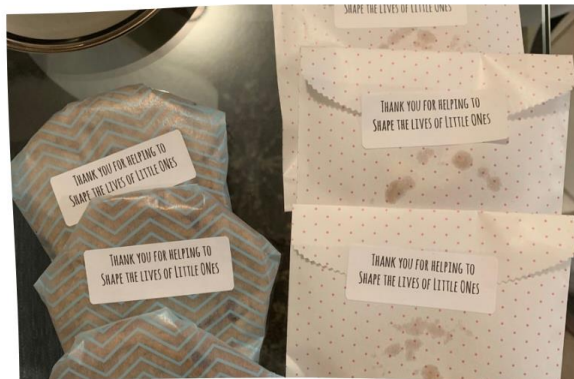








Appendix S- Tokens of Appreciation



Appendix T-Program Evaluation Summaries

**MEMORIAL HEALTH CARE SYSTEM
PROGRAM EVALUATION SUMMARY**

Instructor: Marilyn Tyre, OT/L, MPH, C/NDT **Date:** 2/22/2021

Program: "Shaping the Lives of Little Ones"

Did the program meet your particular needs? **YES:** **NO:**

	Excellent	Very Good	Good	Fair	Poor
Instructor's knowledge of subject	✓				
Speaker's ability to present in a clear & organized manner	✓				
Speaker Presentation	✓				
Program Content	✓				
Instructional Media	✓				
Facility Environment	✓				

How will you be able to use this information on the job?
 It is very helpful for the development of the BPD babies. It is going to improve the respiratory system and the quality of life of our BPD population.

What improvements would you recommend?
 None

What were the most beneficial aspects of the program?
 The positive interaction that the babies are going to have with the environment.

Additional Comments:
 to keep the equipment in the rooms, that way the equipment don't get lost.

Appendix U- Purchase Orders

Memorial Healthcare System
Purchase Requisition Form (P13)

Date: _____ Department/Project Name: _____ Delivery Contact and Ext: _____

Department No (6 Digits) and Expense Acct (4 digit GL Code): _____

Order Type: (Check all as apply) ☐ Construction ☐ Capital ☐ Part of Bulk Buy ☐ Contract ☐ Premier ☐ Outside Funding

Vendor must be an MHS Lawson Vendor (have an active vendor number) or this request will be rejected. Asset Tag: ☐ Y ☐ N

Vendor Name & No.: _____

	Description	Catalog No	Quantity	UOM	Unit Price	Total Cost
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						

Attachments: Check all as apply.
Requisitions without proper attachments will be rejected by Purchasing.

☐ Line Detail (for 10+ lines, use a summary with Grand Total and attach quote or spreadsheet.)

☐ Quotes (All requests totaling over \$5000 must have 3 quotes)
All Equipment must be make only

☐ Letter of Justification

☐ MD Buyline/ECR (Medical Equipment totaling over \$10,000)

☐ ECM Contract Review

☐ Trade In (attach completed Property Transfer Form)

☐ Outside Funding Approval (attach approval from Foundation)

Comments _____

APPROVAL ROUTING - SIGN AND DATE WHERE INDICATED

Department Leader: _____ Date: _____	Department Administrator: _____ Date: _____
IT Administration _____ Date: _____ <small>(If approval is required for all software, hardware connecting to any MHS network)</small>	Facility BioMed _____ Date: _____ <small>(Required Approval required for all electrical equipment)</small>
Facility CFO: _____ Date: _____	SBHD COO: _____ Date: _____
Facility Admin: _____ Date: _____	SBHD CEO: _____ Date: _____

MHS Corporate Finance Use Only

GL Coding/Acct: _____	Asset Tag/Activities: _____
Financial Analyst: _____	Director of Finance: _____ Date: _____
Purchasing Director: _____ Date: _____	Log ID No.: _____
Assigned to Buyer: _____	PO No.: _____

WHITE: Purchasing YELLOW: Finance PINK: RETAIN FOR YOUR RECORDS, SUBMIT OTHER 2 FOR SIGNATURES

5-10003 REV (08/09)