Reducing stress in the neonatal intensive care unit: an occupational therapy approach to preterm infant massage

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REDUCING STRESS IN THE NEONATAL INTENSIVE CARE UNIT:
AN OCCUPATIONAL THERAPY APPROACH
TO PRETERM INFANT MASSAGE

by

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DEDICATION

This dissertation is dedicated to my husband Thomas Kunisch. The culmination of all my work would not have happened without his enduring love and support. He stood by me through the long hours of research and writing and kept our family going throughout this entire process. Without his continued unconditional support, this project would not have been completed. Thank you, Tom. I love you, and now it’s your turn.
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ABSTRACT 

Preterm infants and their parents in the neonatal intensive care unit (NICU) are a growing client population for occupational therapists. The NICU environment of care can be over stimulating and cause high amounts of stress for preterm infants and their parents. Evidence-based literature supports preterm infant massage to decrease stress for preterm infants and improve overall neurobehavioral development. Evidenced-based literature also supports decreased stress for parents that perform preterm infant massage with their child as well as improved confidence of parental skills and infant-parent attachment. Despite these benefits, infant massage is practiced in less than half of the NICUs in the United States (Field, Diego & Hernandez-Reif, 2010). This may be related to the underlying mechanisms not being well understood and/or cost effectiveness considerations. This doctoral project (1) identifies evidenced-based literature to support the benefits of preterm infant massage for both the infant and the parent, (2) investigates evidence and best practice in designing a preterm infant massage parent education program in the NICU that supports the infant-parent dyad, (3) provides an overview of best practice for implementing a preterm infant massage parent education program in the
NICU, (4) describes a detailed evaluation plan and dissemination of the results including estimated budgets for implementation and dissemination. This project’s target audiences are medical directors, directors of occupational therapy departments, neonatal occupational therapists, neonatologists, other health care staff in the NICU, and parents of preterm infants in the NICU. This project will be presented to the medical director of a Level IV NICU and the director of occupational therapy at University of Rochester Medical Center-Golisano Children’s Hospital for consideration of implementation. This project contributes to three areas of occupational therapy: (1) addressing best practice for implementing a preterm infant massage program in the NICU to reduce stress levels for infants and parents, (2) providing more evidenced-based practice with a growing occupational therapy population of preterm infants and their parents, and (3) building a more diverse occupational therapy profession.
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Chapter 1- Introduction

Within occupational therapy, there are calls to promote the health and well-being of individuals using a holistic lens which includes environmental and occupation-based contexts. Health is supported when individuals can engage in occupations that promote participation in their life situations and personal roles (American Occupational Therapy Association (AOTA), 2008). Preterm infants and their parents are a growing client population served by occupational therapists in the neonatal intensive care unit (NICU). Our profession must focus on the unique occupations of infants and parents in the NICU context while incorporating family-centered care. The NICU environment of care is designed to provide complex, life-saving interventions for preterm infants but can also be overstimulating to the infant and parent causing high levels of stress. Evidenced-based research supports preterm infant massage as a means to decrease infant and parent stress levels while promoting infant-parent synchrony and attachment (Cifra & Sancho, 2004; Ferber et al., 2002; Mathai, Fernandez, Mondkar & Kanbur, 2001). Preterm infant massage is an important intervention that occupational therapists working in the NICU can utilize to support the health and well-being of their client population (preterm infants and their parents) while incorporating the environmental and occupation-based context. Unfortunately, only 38% of NICUs in the Unites States have a preterm infant massage program (Field, Diego & Hernandez-Reif, 2010).

When designing a preterm infant massage program, it is essential to train parents to be the “therapist” to support the infant-parent synchronistic dyad. For an occupational therapist to be successful in implementing a preterm infant massage program, she must
understand the life roles of infants and parents and how they interact. Occupational therapists must also understand the unique occupations of preterm infants and their parents which are much different than full term infants and parents. It is critical to incorporate the environmental and task-specific contexts when implementing a preterm infant massage program in the NICU. The NICU environment of care is a key contributing factor causing stress for the infants and the parents. Also, the task of performing infant massage with preterm infants and their parents should be conceptualized as more than just the act in isolation. It should be considered a nurturing and bonding experience for both the infant and the parent with the goal of decreasing infant and parent stress levels in order to positively impact neurobehavioral development and infant-parent attachment. Occupational therapists must obtain a certification in infant massage instruction; have knowledge of the medical complexities of preterm infants and an understanding of the whole child and family in relationship to the task and environment context to be successful in this role.

Research articles on preterm infant massage have examined the benefits for infants and parents (Diego et al., 2007; Ferber et al., 2005; Field, Diego, Hernandez-Reif, Deeds & Figuereido, 2006; Franck, Cox, Allen & Winter, 2005; Hernandez-Reif, Diego & Field, 2007). These studies focus on several preterm infant benefits related to stress such as increased quiet sleep, decreased crying, and heart rate variability (Smith, Lux, Haley, Beachy & Moyer-Mileur, 2013). Several studies also focus on the infants’ overall health and well-being such as weight gain, neurodevelopment, and immune system response (Diego et al., 2007; Field et al., 2006; Hernandez-Reif et al., 2007). Many
studies have focused on parental benefits of preterm infant massage such as reduced stress, reduced anxiety and depression, improved confidence in the parental role, and improved infant-parent attachment (Feijo et al., 2006; Ferber et al., 2005).

**Background**

Based on this author's own experience working in the NICU environment with preterm infants and their parents, along with extensive literature review, the overstimulation of the NICU environment causes stress for preterm infants and their parents. Evidenced-based research articles suggest that stress has a negative impact on preterm infant morbidity, neurobehavioral development, parental role confidence, and infant-parent attachment. Furthermore, many agree that preterm infant massage has several benefits for preterm infants and their parents. For example, preterm infant massage benefits for preterm infants include fewer behavioral signs of stress, increased weight gain, shorter hospital stay and improvement in cognitive and motor development (Field et al., 2010). The benefits of preterm infant massage for parents include improving parent-infant interactions, decreasing parental stress, and increasing infant-parent attachment (Feijo et al., 2006; Ferber et al., 2005). Providing holistic education for parents of preterm infants in the NICU of how to perform infant massage as well as reading and responding to their preterm infants' unique behavioral cues is an important early intervention to reduce stress in the NICU for the infant and parent while promoting positive neurobehavioral and parental role outcomes. Despite these benefits, less than half of the NICUs in the United States practice preterm infant massage (Field et al. 2010). This may be related to the underlying mechanisms not being well understood, lack of
motivation by the occupational therapist to become certified and/or cost effectiveness considerations. Thus, preterm infant massage in the NICU with the parent is an important area for continued research as it will strengthen the evidenced-based foundation and inclusive education of preterm infant massage in the NICU.

**Identified Problem**

Even though NICUs provide necessary and medically complex interventions for preterm infants, the environment can be over stimulating and cause stress for preterm infants and parents that negatively impact neurobehavioral development, parental role confidence and, infant-parent attachment. Several evidenced-based research articles have supported the many benefits of preterm infant massage for both infants and parents but it is still only practice in 38% of NICUs in the Unites States (Field et al., 2010). Also, many of the NICUs that do practice preterm infant massage utilize a trained professional instead of educating the parent to perform the massage.

**Project Overview**

Four objectives were developed for this doctoral project: (1) identify through evidenced-based literature review the impact of stress in the NICU environment of care for preterm infants and their parents, (2) identify through evidenced-based literature review the benefits of preterm infant massage for preterm infants and parents including reducing stress levels; and identify an established massage protocol for a preterm infant massage program and best practice for parent training in the literature, (3) develop a sample program for a preterm infant massage program in the NICU that encompasses a holistic occupational therapy approach, and (4) develop a dissemination plan to present to
administrators at the University of Rochester Medical Center-Golisano Children’s Hospital NICU for consideration of implementation.

This doctoral project first describes the theoretical frameworks for conceptualizing the identified problem of stress in the NICU for preterm infants and parents. Next, an explanatory model of the problem (See Appendix A) and contributing factors are discussed. The project also provides a review of the current literature and methods for addressing the identified problem with a discussion of how the proposed project incorporates these methods. Furthermore, this doctoral project discusses the development of a program that addresses stress in the NICU for preterm infants and their parents through infant massage with a holistic occupational therapy approach. The program incorporates current methods for reducing stress in conjunction with massage including individualized developmental care, skin-to-skin contact, and family-centered care. This project further discusses best practice for parent training methods based on evidenced-based literature. The program was designed to accommodate a highly medically complex NICU environment of care and incorporate evidence-based methods gathered from this project’s extensive literature reviews (See Chapter 3). The program’s target audiences include medical directors of NICUs, neonatologists, directors of occupational therapy departments, neonatal therapists, other NICU health care staff, and parents of preterm infants in the NICU.

Finally, this doctoral project discusses an evaluation plan that was designed for projected implementation of the preterm infant massage program at a Level IV NICU (See Chapter 4). The doctoral project concludes with a proposed funding plan (See
Chapter 5) for implementing a preterm infant massage program at a Level IV NICU and dissemination plan (See Chapter 6) for sharing the results of this project with the target audiences.

**Impact of Project**

Providing infant massage training for parents of preterm infants in the NICU with an occupational therapy approach is associated with several positive expected outcomes. First, this project outlines best practice for developing a preterm infant massage program with the parent in the NICU environment while incorporating a holistic occupational therapy approach. This addresses a gap since less than 1/2 of the NICUs in the United States practice infant massage, despite the benefits (Field et al., 2010). Second, this project addresses preterm infant stress from the over stimulating NICU environment through evidenced-based intervention to promote improved neurobehavioral outcomes. This is critical as the frequency of preterm births is rising as well as the number of infants surviving at earlier gestational ages. An infant’s gestational age can be an indicator of neonatal morbidity and mortality outcomes (Gill, May-Benson, Teasdale & Munsell, 2013). Third, this project also addresses parental stress created by the over stimulating NICU environment since the infant-parent dyad is critical to promote positive preterm infant outcomes. The project is designed to improve confidence in parental skills, the perceptions of the parental role, and overall infant-parent attachment. Evidenced-based research suggests that early parent training of reducing stressful experiences for their preterm infants may improve brain development of the infants (Milgrom et al., 2010). Finally, occupational therapy’s professional work in this area can contribute to the larger
body of knowledge about preterm infant and parent stress in the NICU and the benefits of preterm infant massage for both the parent and the infant. This work may be useful to other health and rehabilitation professionals.

**Occupational Therapy Domain**

The domain of occupational therapy consists of the areas in which practitioners offer assistance to their clients. These areas focus on assisting people to engage in daily life activities which are meaningful to them (AOTA, 2008). Preterm infants have their own occupations that are very unique and meaningful to them. These include responding to environmental inputs, maintaining homeostasis, beginning social interactions with parents, and procuring nourishment to promote growth and development (Vergara et al., 2006). Parenting is a significant occupational role and can be severely impacted by the NICU environment of care. Occupational therapists working with families in the NICU need to have a holistic understanding of the child and family in relationship to the activity they are engaged in and the impact of the surrounding environment. Preterm infant massage supports all of the preterm infants’ occupations and many of the parental occupations. This project is designed to promote the infant and parent occupations as well as the infant-parent dyad synchronicity. Therefore, the projects evidenced-based response to this need falls within the occupational therapy domain (AOTA, 2008).
Preterm birth or prematurity is defined by the World Health Organization (WHO, 2012) as babies born alive before 37 weeks of pregnancy is completed. There are subcategories of preterm birth based on gestational age: extremely preterm (<28 weeks), very preterm (28 to <32 weeks), and moderate to late preterm (32 to <37 weeks). An infant’s gestational age can be an indicator of neonatal morbidity and mortality outcomes. An infant’s birth weight is also a clear predictor of neonatal health outcomes including the achievement of developmental milestones (Gill, May-Benson, Teasdale & Munsell, 2013). The Center for Disease Control classifies birth weight as: extremely low birth weight (<1000g), very low birth weight (<1500 g), low birth weight (<2500 g), normal birth weight (< 4000 g), and high birth weight (> 4000) (as cited in Gill et al., 2013). Gill et al. (2013) state, “Neonatal complications increase markedly depending on infants’ birth weight classifications; the less infants weigh, the higher the chances of encountering health difficulties” (p. 2).

Approximately one million children die each year due to complications from preterm birth (WHO, 2012). Many survivors face a lifetime of disability, including learning disabilities, and visual and hearing problems (WHO, 2012). According to the National Center for Health Statistics (2008), preterm birth affects approximately 1 of every 9 infants born in the United States. Beck et al. (2010) reported, preterm birth is a major determinant of neonatal morbidity and children who are born premature have higher rates of cerebral palsy, sensory deficits, learning disabilities, and respiratory
illness. Estimates indicate that in 2005, the costs to the United States of America alone in terms of medical and educational expenditure and lost productivity associated with preterm birth were more than $26.2 billion (Becket al., 2010).

Preterm infants in the neonatal intensive care unit (NICU) receive complex medical care and are often subjected to extremely stressful situations such as loud noises, bright lights, and painful procedures. In preterm infants, higher procedural pain exposure is associated with altered behavior and cardiac reactivity to subsequent pain in the NICU impacting homeostasis balance (Johnston & Stevens, 1996). These infants can also be deprived of nurturing tactile experiences because of their medical fragility. According to Frasier & Rallison (1972), human infants who experience little tactile input grow more slowly and release less growth hormone. In the NICU environment and due to preterm infants’ medical fragility, parents have limited access to their children, which results in preterm infants having limited experiences receiving nurturing touch. Parents can also feel isolated from their newborns and experience a significant emotional and physical toll.

_Preterm Infant Stress in the NICU_

Stress can be defined as physical, psychological, and social events that provoke excessive reactions and result in difficulty coping (Newnham, Inder & Milgrom, 2009). It can also be described as disequilibrium between an organism and its environment (Newnham et al., 2009). Due to the highly complex medical care provided to preterm infants in the NICU, their environment contains multiple stressors including painful experiences such as heel lances or ventilation, non-painful procedures such as position
changes and administration of medicine, and environmental stressors such as excessive noise and bright lights. According to Newnham et al. (2009), sick preterm infants can endure ... “more than 700 procedures over the hospitalization, more than 200 handling episodes within a 24-h period, and 93 heel pricks within a two week-period” (p. 550).

Stress responses for preterm infants can induce increased heart rate and blood pressure, increase in intracranial pressure, prolonged drops in temperature, and can also induce hypoxemic episodes (Hellerud & Strom, 2002; Long, Philip & Lucey 1980; Scanlon, 1994). In a randomized clinical trial of 30 preterm infants ranging from 28 to 33 weeks gestation, where the experimental group received Newborn Individualized Developmental Care and Assessment Program to reduce stress within 72 hours of NICU admission, quality of experience prior to reaching term was found to be significantly associated with brain function at 9 months corrected age (Als et al., 2004).

Unfortunately, these multiple stressors take place at a time when preterm infants' central nervous system is vulnerable to insult by a means of stressors (Bhutta & Anand, 2002). Newnham et al. (2009) argue, “It is the accumulated stress, or the totality of large and small, multiple stressors occurring over time that... may affect preterm infant development...” (p. 549). Essential adaptation to stressful situations arises from stress responses but when responses are required excessively and over a long period of time, disease processes can be accelerated (Gunnar & Quevedo, 2007; McEwen, 2000). In a prospective cohort study of 44 infants born at less than 30 weeks gestation, exposure to stressors in the NICU was found to be associated with alterations in brain structure and function (Smith et al., 2011). Thus, stress endured by preterm infants in the NICU can
adversely affect infant morbidity and neurodevelopmental outcomes.

**Parental Stress in the NICU**

The NICU environment of care presents multiple stressful elements for parents of infants born prematurely and has been well-documented in the literature (Dudek-Schriber, 2004; Miles & Frauman, 1993; Miles & Holditch-Davis, 1997). Three major sources of stress for them, as reported by Franck, Cox, Allen & Winter (2005), are the physical environment, sight of their ill infant, and loss of their expected parental role as being the most significant. Factors that were reported as stressful relating to the physical environment include bright lights, noisy ventilators and monitors, chemical odors, and the sight of their own and other sick infants. Predictably, the appearance of their infant with ill characteristics such as unusual color, bruises, and small size while connected to tubes and wires and surrounded by medical staff is anxiety inducing. However, parents have reported the greatest source of stress involved with having a preterm infant in the NICU is the inability to fulfill their parental expectations due to the inability to perform typical parenting tasks such as feeding and consoling (Franck et al., 2005). Parents also describe a feeling of helplessness because they cannot protect their infant from infliction (Franck et al., 2005). The NICU staff may also unintentionally compound the sense of parental role loss through their interactions with the parents (Miles et al., 1993).

According to Bell, St-Cry Tribble, Paul & Lang (1998), physical and emotional proximity through prolonged sensorimotor interactions, such as visual and tactile, is fundamental for building a secure parent-infant relationship. Although current advances in technology support the survival of preterm infants, NICU environments continue to
isolate critically ill infants from their parents and may adversely impact infant-parent attachment, as well as, infants' neurodevelopmental outcomes (Affleck & Tennen, 1991; Franck et al., 2005; Singer et al., 1999). Parental feelings of stress and separation can evolve into feelings of detachment from their infant due to the loss of their parental role (Johnson, 2008). A delay in infant-parent attachment may contribute to greater parenting stress and increased infant vulnerability after discharge to home (Affleck et al., 1991; Huber, Holditch-Davis & Brandon, 1993). In a controlled cohort study of 152 preterm infants born at less than 30 weeks gestation and weighing less than 1250 grams, parent-child synchrony was associated with neurobehavioral development at 2 years corrected age (Treyvaud et al., 2009).

Use of Dynamic Systems Theory of Development to Explain the Problem

Dynamic Systems Theory (DST) conceptualizes motor development as emerging from the cooperative interactions among many subsystems in a task and environment specific context (Thelen & Ulrich, 1991). Hierarchical development theory would suggest a direct relationship between brain development and short- and long-term neurodevelopmental outcomes, but according to DST, that relationship appears to be decidedly complex and indirect (MacKendrick, 2006). Esther Thelen, a developmental psychologist, applied the principles of nonlinear dynamic systems to motor, perceptual, and cognitive development in a synthesis that advanced the perspective of developmental science (Lewkowicz & Lickliter, 1995). The infant is viewed as an active participant whose movement self-organizes from many different subsystems within the environmental and task context (Heriza, 1991). Self-organization means that behavior is a
pattern formed from multiple components in cooperation, with none being more privileged than another (Wikipedia, n.d.). The relationship between the multiple parts is what helps provide order and pattern to the system. Kamm, Thelen & Jensen (1990) state, “The underlying assumption of a dynamical systems approach to behavior and development is that biological organisms are complex, multidimensional, cooperative systems” (p. 770). For example, an infant producing a kick involves not just muscles and motor neurons. Other subsystems involved in producing a kick include sensory, perceptual, integrative neural components, respiratory, cardiac, and autonomic elements (Heriza, 1991). All of these subsystem interactions, including environmental input, assemble to produce a controlled movement that is amplified by positive feedback.

Due to the theoretical contention of DST that within a dynamic system even a small shift in one subsystem can cause unpredictable and complex systematic changes (Gray, Kennedy, & Zemke, 1996), preterm infants are at a much higher risk for poor neurodevelopmental outcomes due to the impact of prematurity on multiple subsystems. Neurodevelopmental impairments are prevalent in as many as 50% of infants born at extremely low birth weight (<1000g) or extremely early gestational age (<28 weeks) (Larson et al., 2011). According to Beck et al. (2010), preterm birth is a major determinant of neonatal morbidity and children who are born premature have higher rates of cerebral palsy, sensory deficits, learning disabilities, and respiratory illness.

The dynamic systems approach views the environment as a key contributing factor in developmental outcomes. This provides the link for how overstimulation in the NICU environment can impact preterm infants’ neurodevelopment. Even routine and
non-painful activities such as position changes can create disorganized physiological and
behavioral responses in preterm infants such as bradycardia, increased intracranial
pressure, sleep disruptions, and poor self-regulation (Als et al., 2003; Harrison, 2001;
Holsti & Grunau, 2007). Teicher et al. (2003) suggest that early exposure to
environmental stress may alter brain development and may change subsequent responses
to stressors. Thus, the over stimulating NICU environment is one factor that can increase
preterm infants’ stress reactivity and may impact overall neurodevelopment.

Use of Sensory Integration Theory to Explain the Problem

Jane Ayers defined sensory integration as the neurological processes that
organizes sensation from one’s own body and the environment and makes it possible to
use the body effectively within the environment (as cited in Bundy, Lane & Murray,
2002). According to sensory integration theory, the central nervous system (CNS) is
plastic or malleable and the person-environment interaction promotes neuro-integrative
efficiency (Bundy et al., 2002). DST and sensory integration theory share similar
assumptions regarding the interaction of the organism or person and the environment.

Anderson (1986) reports “Two major factors influence the preterm infant’s ability
to assimilate and respond to sensory stimuli: gestational age and the degree of medical
complications” (p. 19). When preterm infants were compared to full term newborns,
preterm infants had increased disorganized sleep states, lower activity state, and
decreased crying (Anderson, 1986). Preterm infants were also found to be more difficult
to console (Anderson, 1986). A compelling difference in the neurobehavioral status
between low birth weight (LBW) preterm infants at 40 weeks gestation and full term
infants was found in visual and auditory orienting responses (Kurtzberg, Vaughan, Bruce, Albin & Rotkin, 1979). However, early tactile and vestibular input may have positive effects on the preterm infants' sensory performance (Anderson, 1986).

Many preterm infants undergo intensive medical and surgical intervention as well as endure prolonged hospitalizations to stabilize physiological, nutritional, and neurobehavioral systems. Since the tenet of sensory integration states that the person-environment interaction promotes neuro-integrative efficiency, these long and complicated hospitalizations may have a negative impact on preterm infants' sensory and neurobehavioral outcomes. The NICU also provides varied and at times noxious stimuli. Evidenced-based research suggests that preterm infants in the NICU receive inappropriate patterns of stimulation that may be unfavorable for sensory processing (Anderson, 1986; Newman, 1981).

Use of Attachment Theory to Explain the Problem

Attachment theory is described as a reciprocal process of recognizable patterns of interactive behaviors through physical and emotional proximity between parent and infant (Franklin, 2006). The essential characteristics described as critical attributes of positive attachment are proximity, reciprocity, and commitment and are considered a part of the parental role attachment process (Schenk, Kelley, & Schenk, 2005). According to Rubin (1984), attachment develops during the first 6 months of life as the parent accepts the infant and acquires the abilities to care for and nurture the infant through cue sensitivity (as cited in Johnson, 2008). In order to build a secure parental-infant relationship, the parent and infant need to engage in prolonged physical and emotional
closeness through the acts of looking, touching, smelling, and making sounds (Bell et al., 1998).

In the NICU environment of care, many parents struggle with limited parental interactions and difficulty establishing their parental role since nurses and other health care providers care for their preterm infant in their stead. Family bonding in the NICU is often a very difficult process, which is interrupted by separation of parents and infants and continued by the physical constraints of this highly complex, critical care environment (Haut, 1994). Not only are parents separated from their infant, sometimes for long durations, they are also unsure of how to handle their medically fragile child while observing health care providers supporting their infant’s physiological needs. This can lead to feelings of helplessness and decreased attachment with their infant.

Attachment should be considered an individualized process and may be dependent on the health status of the infant and the mother, environmental circumstances, and on the quality of care infants receive in the NICU (Bialoskurski, Cox, & Hayes, 1999).

Synthesis of Relevant Evidence-Based Research

The literature review regarding the proposed explanatory model of the problem clearly supports each component of the model promoting the necessity of the proposed intervention (See Appendix A). This intervention will consist of a hands-on training experience for parents of preterm infants in the NICU. It will focus on massage therapy with their infant to decrease the infant’s and parent’s stress levels to improve positive neurodevelopmental outcomes for the infant and satisfaction in the parental role for the parent. In this section of Chapter 2, the current literature related to the development of the
proposed intervention will be explored. Two questions were designed to guide the literature search:

1) What evidence exists that supports the effectiveness of interventions for preterm infants in the NICU to decrease their level of stress and that of their parents?

2) What evidence exists to support the benefits of preterm infant massage for infants and parents?

An extensive literature search was conducted using PubMed, CINAHL, PsychINFO, Child development and adolescent studies, Cochrane database of systematic reviews and Google Scholar using the following keywords to locate relevant information: “NICU”, “neonatal intensive care unit”, “environment”, AND “stress”, “anxiety”, “depression”, “trauma”, “experience”, combined with “preterm infant”, “baby”, “neonate”, “premature”, or “parent”, “caregiver”, “mother”, “father”. The database search was limited to peer-reviewed journal articles published between 2002 and 2013 and available in the English language. Articles were selected for review based on their relevance to the literature search questions, relevance to the project population(s) and quality of the research design. Based on these criteria, articles were selected for full review. The outcome of the literature search will be discussed below as well as implications for the proposed intervention.
What evidence exists that supports the effectiveness of interventions for preterm infants in the NICU to decrease their level of stress and that of their parents?

*Individualized Developmental Care in the NICU*

Recent advances in neonatal management of preterm infants has resulted in a significant increase in survival rates, especially infants that are born earlier than 28 weeks and with very low birth weight (Als et al., 2003; McAnulty et al., 2009). The incidence of disability and neurodevelopmental issues among survivors remains high and problematic. Preterm birth disrupts the developmental progression of brain structures and preterm infants’ experience in the NICU environment “may exert deleterious effects on the immature brain and alter its subsequent development” (Als et al., 2004, p. 846).

The Synactive Theory of Development provides a framework for the conceptualization of preterm infants’ neurobehavioral organization capabilities (Als et al., 2003; Van der Pal et al., 2008). This theory provides a model for identifying and defining the unique way each infant is able to organize and control their behavior (Als, 1982). It is based on the proposition that infants communicate their thresholds for stability or stress through behavior which provides the basis for developmentally appropriate assessment and provision of supportive care (Als, 1986). The infant’s behavior emerges through a continued interaction with the environment and is observed across five systems 1) autonomic e.g. skin color, respiration; 2) motor e.g. posture, tone, movements; 3) state e.g. quiet alert, crying, drowsy; 4) attention and interaction e.g. availability of the infant for interacting, alertness; 5) self-regulation e.g. success of infants’ efforts to achieve balance of the other four systems (Als et al. 2003; Van der Pal
et al., 2007). Each system can be described independently, yet functions in relation to the other systems. In preterm infants, these systems are not yet fully developed and preterm behaviors are generally characterized by disorganization and signs of stress (Als et al., 2003; 2004). Therefore, preterm infants are more dependent on their environment to help support and maintain balanced self-regulation.

In this context, the Newborn Individualized Developmental Care and Assessment Program (NIDCAP) was introduced in the 1980s and consists of trained observations of preterm infants' efforts at self-regulation and interaction followed by individualized recommendations to modify the infants' environment and care giving (Als et al., 2003). NIDCAP also focuses on the importance of collaborating with the family to improve parental role function and infant behavioral outcomes (Van der Pal et al., 2007). Results of NIDCAP intervention studies have shown positive outcomes for children and their families (Als et al. 2003; 2004; Kleberg, Hellstrom-Westas & Widstrom, 2007; McAnulty et al., 2009; Van der Pal et al., 2008; Van der Pal et al., 2007; Westrup, Bohm, Lagercrantz & Stjerqvist, 2004). A randomized control trial (RCT) in three centers in the United States with 92 preterm infants found less parental stress in the NIDCAP group at two weeks after the expected due date (Als et al., 2003). An RCT conducted in Sweden, with 26 infants born with a postmenstrual age less than 32 weeks, found a positive impact of NIDCAP on behavior at preschool age compared to conventional care (Westrup, et al., 2004).

The proposed intervention of a preterm infant massage therapy program using an occupational therapy approach encompasses individualized developmental care based on
NIDCAP. Occupational therapy supports individualized intervention based on each individual's unique strengths and limitations within the environmental context and views parenting as a significant occupational role while promoting family-centered care (Occupational Therapy Practice Framework, 2008). The massage therapy program will include facilitation of parent's understanding of their infant's stress signs and how to modify the environment and their care giving to decrease infant's stress level using NIDCAP framework.

According to Vergara et al. (2006), "...an important role of the occupational therapist is to assist each family to foster optimal infant development, including the encouragement of developmentally appropriate occupations, sensorimotor processes, and neurobehavioral organization" (p. 659). Occupations of a preterm infant are responding to the environment, maintaining homeostasis, beginning social interactions with parents and, taking in nourishment (Vergara et al., 2006). To do this, the massage therapy program will include parental education of infant stress signs as follows:

1) **Autonomic Signs of Stress**

   - Color changes (pallor, flushing: turning red, and cyanosis: turning blue)
   - Changes in vital signs (heart rate, respiratory rate, blood pressure (BP), pulse ox rate)
   - Visceral responses (vomiting, gagging, hiccups, passing gas)
   - Sneezeing
   - Yawning
2) Motor Signs of Stress

Generalized hypotonia (limp, decreased resistance to moving of infants' extremities)

Frantic flailing movements

Finger splaying (holding fingers spread wide apart)

Hyperextension of extremities (arms or legs extended straight out almost in a locked position)

3) State Signs of Stress

Diffuse sleep states (lots of twitching, grimacing, not resting peacefully)

Glassy-eyed (appears to be "tuning out")

Gaze aversion (cuts eyes to the side trying not to look at what is in front of them)

Staring (a locked gaze, usually wide open eyes)

Panicked look

Irritability (hard to console)

4) Attention/Interaction Signs of Stress

Infant will demonstrate stress signals of the autonomic, motor, and state systems

Inability to integrate with other sensory input (can't look at face, listen to talking and suck a bottle at the same time)

5) Self-Regulatory Behaviors - these are attempts to deal with stress and regain control

Change in position

Hand-to-mouth
Grasping
Sucking
Visual locking
Hand clasping

Parental education will also include intervention strategies to use to decrease infant signs of stress during massage therapy and throughout the infant’s day as follows:

1) *Appropriate Timing of Massage Therapy* – Evidence-based literature has suggested that one hour after feeding can be an appropriate time for massage therapy to avoid increasing the risk of reflux (Diego, Field & Hernandez-Reif, 2005; Dieter, Field, Hernandez-Reif, Emory & Redzepi, 2003; Field, 2002; Field, Diego & Hernandez-Reif, 2010).

2) *Infant’s Immediate Environment*- Look at and listen to infant’s immediate environment from his/her point of view. Provide the least stimulating environment as possible in relation to lights, sounds, and objects in the infant’s visual field. This will provide an optimal sensory environment for the infant to focus his/her energy on the comforting touch and parental interaction.

3) *Promoting Self-Regulation*- Use of rolls and other supports to help keep the infant in a comfortable flexed position. Holding the infant’s hand (gently placing a finger in the infant’s palm, which stimulates the grasp reflex) or giving them something to suck on can be calming. When possible, slow the pace of the massage or give the infant a break if signs of stress are noted. As the infant shows signs of stability, the massage can be resumed gradually.
Skin-to-Skin Contact in the NICU

Skin-to-skin contact (also known as Kangaroo Care) can be defined as the early, continuous and prolonged contact between the infant’s skin and the caregiver’s skin. The infant is placed in prone and in an upright position on the caregiver’s chest under the shirt and then covered by a warm blanket to support infant temperature stability. The goal of skin-to-skin contact is to promote parent-infant bonding and facilitate physiological stability and minimize energy expenditure by the infant. Kangaroo Mother Care specifically involves the mother to promote lactation and breastfeeding. Skin-to-skin contact was developed in Bogota, Colombia in 1978 by Dr. Edgar Rey Sanabria, Professor of Neonatology at the National University of Colombia, due to a shortage of incubators for low birth weight infants, but has since been shown to have positive effects on mother-infant interaction and infant physiological conditions such as increased quiet sleep state, more stable thermoregulation and decreased variability in heart rate, respiratory rate, and oxygen saturation in evidenced-based literature (Chiu & Anderson, 2009).

Mothers who participated in skin-to-skin contact with their preterm infant while in the NICU report the experience provided an opportunity for them to “get to know” more about their infant during a stressful period (Roller, 2005). The evidenced-based literature suggests that skin-to-skin contact provides an avenue for parents to learn about their infant’s needs, develop emotional attachment, and to reconcile their feelings about having a premature birth (Chiu et al., 2009). Feldman, Eidelman, Sirota & Weller (2002) reported that skin-to-skin contact while in the NICU promoted parents that were more
sensitive, family style that was more cohesive, and a positive impact on the infant's perceptual-cognitive and motor development compared to infants that received traditional care. Johnson (2007) reported that mothers who experienced just 60 seconds of skin-to-skin contact with their infants reported feeling more confident in knowing how to care for their infant. Skin-to-skin contact between parent and preterm infant while in the NICU facilitates parent-infant bonding and reduces parental stress (Anderson, Moore, Hepworth & Bergman, 2003; Roller, 2005; Tallandini & Scalembra, 2006). Preterm infants also show a positive impact after receiving skin-to-skin contact while in the NICU. Very-low and low-birth weight infants show better behavioral organization, such as longer periods of quiet sleep and alertness, after receiving skin-to-skin contact (Feldman & Eidelman, 2003; Ohgi et al. 2002). Research on the effects of skin-to-skin contact underscores the importance of parental body contact for infants' physiological, emotional, and cognitive regulatory capacities (Charpark et al., 2005; Conde-Agudelo, Belizan & Diaz-Rossello, 2003; Feldman et al., 2002). Thus, skin-to-skin contact may be considered to be mutually beneficial and comforting for the parent and infant and promotes infant-parent attachment.

The proposed intervention of a preterm infant massage therapy program provided by the parent encompasses the skin-to-skin contact concept by providing daily opportunities for the parent to provide comforting skin-to-skin tactile input for the preterm infant. Using moderate pressure during preterm infant massage has been shown to significantly lower stress behavior, increase deep sleep, improve heart rate variability and increase vagal tone when compared to light pressure (Diego et al., 2007; Field,
Diego, Hernandez-Reif, Deeds & Figuereido, 2006). During the hands-on training sessions, emphasis will be placed on the importance and benefits of skin-to-skin contact using moderate pressure during massage.

*Family-Centered Care in the NICU*

Recent medical advances have allowed a greater number of preterm infants to survive; however, morbidity remains high and creates great emotional and financial burden on families and society (National Center of Health Statistics, 2008). Evidence supports that low birth weight infants experience a myriad of adverse physical and behavioral delays (Melnyk et al., 2001; 2006; Newnham et al., 2009). Parents of preterm infants in the NICU experience multiple traumas, high levels of stress, and feelings of helplessness (Dudek-Schriber, 2004; Melnyk et al., 2006). Negative parent-infant interactions can lead to adverse parenting outcomes after discharge such as depression and anxiety (Melnyk et al., 2006).

Several early intervention programs have been developed to empower parents by developing healthy perceptions and interactions in the NICU environment of care. Evidence suggests that parents who engage, through positive interactions, with their preterm infants early on tend to be more sensitive to the infant’s needs and cues in later years (Melnyk et al., 2001; Melnyk et al., 2006). Mothers of preterm infants in the NICU who were provided with an educational intervention program reported less stress than mothers in a comparison group (Melnyk et al., 2001). Family-centered care in the NICU that strengthens the parent’s knowledge about their preterm infant and their own parenting role has shown to have decreased parental negative mental health outcomes.
during the NICU stay and post discharge (Melnyk et al., 2001; Melnyk et al., 2006; Newnham et al., 2009). Also, there is evidence suggesting it is possible to improve parent-infant interaction through parent training programs that involve teaching positive parent-infant interaction skills and requiring parents to practice the skills during program sessions (Centers for Disease Control, 2009; Newnham et al., 2009).

The proposed intervention of a preterm infant massage therapy program through an occupational therapy approach embodies family-centered care. This has been deftly stated by Dudek-Shriber (2004), “In occupational therapy, family-centered care requires the therapist to recognize the infant as part of a family system. The philosophy of occupational therapy on early intervention is based on family-centered care principals that emphasize parent-professional collaboration in an effort to help family members develop positive relationships with their newborn (and) gain confidence in their ability to care for their infant…” (p. 510).

The proposed intervention will include the following:

1. One, one-hour hands-on training session with an occupational therapist (OT) certified in infant massage;
2. One, one-hour session where the OT will observe the parent providing massage therapy to provide reinforcement (more sessions may be added at the parents’ or OT’s discretion);
3. One follow-up visit to assess outcomes
4. A YouTube digital video available for parents’ reference
5. Written educational material with the specific step-by-step protocol geared toward a low literacy level (See Appendix B).

The parent will practice the massage protocol on a doll in the initial training session and at home prior to the initiation of massage with their infant.

Throughout the preterm massage therapy training program, the parent will be educated on understanding the infant’s stress signs, evaluating stressful factors in the NICU environment for the infant and themselves, and strategies to decrease stress for the infant and themselves. The preterm infant massage therapy program through an occupational therapy approach is designed to enhance parent sensitivity and understanding of their preterm infant’s unique needs and to encourage the use of well-researched early intervention techniques.

Most preterm infant interventions to reduce stress in the NICU to date comprise of using professionals as the primary interventionist. Even skin-to-skin contact that involves parent intervention tends to be limited to mothers and regulated by increasing frequency and duration, which can be very difficult in the NICU environment. Preterm infant massage through an occupational therapy approach utilizes a holistic lens and incorporates the infant-parent dyad within the intervention to decrease stress levels and improve overall outcomes for both. The goal of the massage therapy program with the parent as the “therapist” is to enhance the quality of parent-infant interaction by teaching parents’ sensitivity and responsiveness to their infants’ cues. Preterm infant massage also fits well within the NICU environment since the regulation of the frequency and duration
of each session is controlled by the parent and the infant’s unique needs which will allow
the parent to take responsibility for recognizing and supporting the infant in real time.
This will in turn, promote the parental role that may have been significantly minimized
by the NICU environment of care.

What evidence exists to support the benefits of preterm infant massage for infants
and parents?

Evidence Supporting Preterm Infant Massage Benefits for Infant

Evidenced-based literature suggests that infant massage has many benefits for
preterm infants in the NICU. These benefits include increased weight gain, shorter
hospital stay, fewer infant behavioral signs of stress, and improvement in cognitive and
motor development (Field et al., 2010). Recently the research for preterm infant massage
has been studying the mechanism of improved weight gain. For example, in a RCT
conducted by Diego et al. (2007) of 80 preterm infants, preterm infant massage was
shown to elicit consistent increases in vagal activity and gastric motility that were
associated with greater weight gain. It was suggested for the study’s outcome that
massage therapy may stimulate the vagal efferent fibers that innervate the digestive
system by stimulating baroreceptors and mechanoreceptors within the skin. Vagal
activity and gastric motility are associated with parasympathetic nervous system activity
and the attenuation of the stress response. Moyer-Mileur, Haley, Slater, Beachy & Smith
(2013) state, “Optimal weight gain is essential for survival and long-term health of
preterm infants” (p. 490). Following intensive care treatment, weight gain becomes the
main criterion for hospital discharge and preterm infants that receive massage therapy
have hospital stays that are 3-6 days less than control infants (Diego et al., 2005; Dieter et al., 2003). Massage therapy has led to weight gain in preterm infants when moderate pressure massage was provided (Field et al., 2010). These results have been replicated by many other independent groups (Cifra & Sancho, 2004; Ferber et al., 2002; Mathai, Fernandez, Mondkar & Kanbur, 2001).

Further, research suggested that massage intervention for low-risk preterm infants affects the maturation of brain electrical activity (measured by EEG spectral activity) and favors a process more similar to that observed in utero in full term infants (Guzzetta et al. 2011). Massage therapy can improve attenuation of stress behaviors by preterm infants in the NICU by promoting behavioral organization and perhaps enhancing longer periods of parasympathetic activity (Diego et al., 2007; Field et al., 2006; Hernandez-Reif, Diego & Field, 2007). Infant massage can help infants sleep more, reduce crying, and positively affect hormones that control stress (Smith, Lux, Haley, Beachy & Moyer-Mileur, 2013). Male preterm infants that received infant massage showed improved heart rate variability similar to term infants which supports their ability to respond to stressors in a masked, randomized longitudinal study of 80 preterm infants (Smith et al., 2013).

Moderate pressure massage therapy is a key component to the preterm infant massage protocol. Evidence-based research has noted that moderate pressure therapy is more effective to improve weight gain and heart rate variability than light pressure therapy for full term and preterm infants (Diego et al., 2005; Field et al., 2004). In a randomized control trial of 68 preterm infants with a mean gestational age of 30 weeks by Field et al. (2006), the moderate pressure therapy group showed significantly less
crying, hiccupping, fussing, and active sleep; all behavioral signs of stress when compared to infants receiving light pressure massage. The moderate pressure group also had greater weight gain which is consistent with several other studies on preterm infant massage.

**Evidence Supporting Preterm Infant Massage Benefits for Parent**

Parents of preterm infants in the NICU experience high levels of stress, anxiety and, even depression due to the subsequent separation between parent and infant, the sight of their ill appearing infant, constant bells and disturbing sounds in the NICU, and sometimes staff behavior and communication. Studies have shown that parents report the greatest source of stress is the alteration in their parental role since they are unable to perform the normal, expected parenting tasks and are not able to protect their infant (Ferber et al., 2005; Franck, et al., 2005). Separation between parent and child at birth and parental stress has been shown to have an unfavorable effect on parent-infant attachment (Ferber et al., 2005; Treyvaud et al., 2009). Therefore, intervention that promotes positive infant-parent interaction is essential in facilitating favorable outcomes.

Research on the benefits of preterm infant massage on parent stress levels is limited and needs more rigorous study. However, research on preterm infant massage therapy by the mother is suggested to improve mother-infant interactions and decrease parental stress immediately and at three months of age in two randomized controlled trials (Feijo et al., 2006; Ferber et al., 2005). In the Feijo et al. (2006) study, just one session was shown to be effective in decreasing the mother’s depression and anxiety symptoms based on The State Anxiety Inventory (Spielberger, Gorsuch & Lushene, 1970)
and *The Profile of Mood States Depression Subscale* (McNair, Lorr & Droppleman, 1992). However, in this study, mothers performing infant massage were compared to mothers observing their infant receiving massage and both groups reported reduced depressed symptoms. This may be due to the fact that the mothers that observed their infant receiving massage perceived their infant as benefiting from the massage. Even so, only the mothers that performed infant massage reported both reduced depression and anxiety. Ferber et al. (2005) found that preterm infant massage facilitated more maternal competence, positive affect, and adaptation to infant cues at 3 months of age. A small study of 16 first time mothers with postnatal depression showed a significant improvement in depressive symptoms following infant massage classes compared to a support group (Glover, Onozawa & Hodgkinson, 2002).

Ferber et al. (2002) examined the effects of preterm infant massage therapy by mothers compared to trained professionals and a control group. They reported that both the mothers’ and trained professionals’ group gained significantly more weight compared to the control group. Thus, mothers were able to achieve the same benefits of infant weight gain following massage as trained professionals. Also, moderate pressure massage therapy by parents has been shown to improve growth, decrease agitated behaviors, and increase orientation for newborns (Field et al, 2004).

Infant massage provides essential indicators of infant-parent attachment including close proximity, eye contact, comforting touch, thermal regulation, and other sensorimotor interactions. With holistic education and guidance by an occupational therapist certified in infant massage, the parent can become more confident and
competent in caring for their child by giving them the tools to understand their child’s unique needs and behavioral cues. Infant massage can also increase parents’ confidence in their skills as a parent by providing a regular time of comforting touch between the parent and child. Through infant massage, the parents can begin to feel as a greater part of their child’s healing process.

**Conclusion**

Preterm infants and their parents experience significant stress associated with the NICU environment of care. Preterm infants are exposed to bright lights, loud noises, painful procedures, and procedural touch. Their parents can experience stress due to being separated from their infant, the sight of their sick infant, an inability to console their infant, and most importantly a loss of their parental role. This stress has a negative impact on overall preterm infant neurobehavioral development and infant-parent attachment. There have been several early intervention strategies to reduce preterm infant stress and parent stress. These include individualized developmental care, skin-to-skin contact between the parent and the child, and family-centered care. Preterm infant massage therapy has been shown to have a positive impact in reducing infants’ and parents’ stress, improving preterm infant neurobehavioral outcomes, and infant-parent attachment (Feijo et al., 2006, Ferber et al., 2005; Field, Diego & Hernandez-Reif, 2010; Procianoy, Mendes & Silveira, 2010). Evidenced-based research also suggests that preterm infant massage improves weight gain, sleep patterns, and also decreases NICU length of stay (Diego, Field & Hernandez-Reif, 2005; Diego et al., 2007; Dieter, Field, Hernandez-Reif, Emory & Redzepi, 2003).
The proposed program consists of an occupational therapist, with specialized NICU knowledge, educating parents of preterm infants how to perform massage therapy with their infant to reduce stress for both. The educational program will consist of hands-on training, written educational material, and a You-Tube video for reference. The program will include educating parents on how to understand their infant’s behavioral signs and how to respond adaptively; similar to Alis (1982) individualized developmental care concept. The program consists of daily skin-to-skin contact between the infant and parent through moderate pressure stroking and provides skin-to-skin contact that is mutually beneficial for the infant and the parent. Furthermore, the proposed program uses the parent as the massage therapist exclusively to support family-centered care strategies. The goal of the massage therapy program with the parent as the “therapist” is to enhance the quality of parent-infant interaction by teaching parents sensitivity and responsiveness to their infants’ cues.
Chapter 3- Description of the Proposed Program

Evidenced-based research has supported many benefits of infant massage for preterm infants in the neonatal intensive care unit (NICU). These benefits include increased weight gain, shorter hospital stays and increased hospital cost savings, fewer infant behavioral signs of stress, improvements in cognitive and motor development, improved parental bonding, and parental awareness of infants’ needs (Diego, Field & Hernandez-Reif, 2005; Diego et al., 2007; Dieter, Field, Hernandez-Reif, Emory & Redzepi, 2003; Feijo et al., 2006; Field, Diego & Hernandez-Reif, 2010; Ferber et al., 2005; Procianoy, Mendes & Silveira, 2010). During a randomized trial of 73 infants born less than 32 weeks gestational age and weighing between 750 grams and 1500 grams, infants that received massage therapy had better neurodevelopmental outcomes at 2 years corrected chronological age (Procianoy et al., 2010). Therefore, infant massage has the potential to have a positive impact on preterm infants’ motor, cognitive, and sensory development. Evidenced-based research has also shown that parents of preterm infants benefit from infant massage because it enhances bonding with their children and increases confidence in their parenting role (Beachy, 2003; Feijo et al., 2006; Ferber et al., 2005; Ferber et al., 2002). In a randomized controlled trial of 40 mothers whose preterm infants were about to be discharged from the NICU, the group that conducted preterm infant massage had lower feelings of anxiety after one session (Feijo et al., 2006). Providing infant massage has also been found to be beneficial for mothers experiencing postnatal depression (Glover, Onozawa & Hodgkinson, 2002). Furthermore, in the Treyvaud et al. (2009) study that assessed the relationship between parent-child
synchrony and neurobehavioral development in very preterm infants at 24 months of age, the authors concluded, “These findings have implications for the development of targeted parent-based interventions to promote positive outcomes across different developmental domains during the first 2 years of life for very preterm children” (p. 555).

The proposed program involves the development of a preterm infant massage-parent education program with an occupational therapy approach. Based on the dynamic systems theory, sensory integration theory, and attachment theory; this author believes that a preterm infant massage program with an occupational therapy approach will be an effective intervention to address the problems that preterm infants and their parents face related to stress within the NICU environment of care. This stress impacts infant-parent attachment and overall preterm neurobehavioral development. If a preterm infant massage program with an occupational therapy approach were used with stable preterm infants and their parents in the NICU, it would have an indirect impact on both qualitative and quantitative changes in preterm infants’ neurodevelopment and sensory integration as well as infant-parent attachment. The quantitative changes may include improved weight gain, improved motor and sensory development, and shorter hospital stay. The qualitative changes may include decreased infant behavioral signs of stress, improved infant-parent attachment and, parental awareness of the infants needs.

The proposed intervention will include the following:

1. One, one-hour hands-on training session with an occupational therapist certified in infant massage;

2. One, one-hour session where the OT will observe the parent providing
massage therapy to provide reinforcement (more sessions may be added at the parents or OTs discretion)

3. One follow-up visit to assess outcomes

4. A YouTube digital video available for parents' reference

5. Written educational material with the specific step-by-step protocol geared toward a low literacy level (See Appendix B).

The parent will practice the massage protocol on a doll in the initial training session and at home prior to the initiation of massage with their infant.

Throughout the preterm massage therapy training program, the parent will be educated on understanding their infant’s stress signs, evaluating stressful factors in the NICU environment for the infant and themselves, and strategies to decrease stress for their infant and themselves. The preterm infant massage therapy program through an occupational therapy approach is designed to enhance parent sensitivity and understanding of their preterm infant’s unique needs and to encourage the use of well-researched early intervention techniques.

*Occupational Therapy Domain*

Infant massage is considered an ancient tradition that has been practiced globally for centuries. This therapy has been increasingly used in Western cultures and is becoming a specialty in the United States (Beider, Mahrer & Gold, 2007). There is more than one internationally accredited infant massage training program that offers from two-four day classes to become certified as an infant massage instructor or educator. These
certification training programs include massaging medically fragile preterm infants: the population of the proposed program. Therefore, an occupational therapist implementing the proposed program will be required to have a certification in infant massage therapy from an accredited training program. Occupational therapists working in the NICU with preterm infants and their families also need to have specialized knowledge of the medical complexity of the infant and an understanding of the whole child and family in relationship to the task and environmental contexts.

An occupational therapy approach within the proposed program offers a holistic lens into not only the person(s) (infant/parent) and environment (NICU) but also the occupations of the infant and parent. This encompasses the person/environment/occupation model put forth by Law et al. (1996) which defines occupational performance as the relationship between individuals, their roles and unique occupations, and the environments which they live. The proposed program recognizes and incorporates all three of these domains. The environment is the NICU, which provides life-saving medical interventions for preterm infants. However, the NICU is a significant source of over stimulation and stress for both the infant and the parent. The very medical interventions that are critical to infants’ survival can interfere with infants’ self-organization and neurodevelopmental maturation and differs from the fetal environment. Bright lights and loud noises can also provide overwhelming stimulation. The NICU environment can be stressful for parents as well, due to separation from their child, overwhelming sights and sounds and, most importantly, a loss of their parental role.
The person or persons that this program constitutes are not the infant in isolation nor the parent in isolation, but the infant and parent as a dyad. For the purpose of this project, the infant-parent dyad regards the infant and parent as one pair and encompasses the subjective synchrony between the two. The focus of this program is to provide an intimate, safe interaction that enhances both parents’ occupation, as well as infants’, within the environmental context where this process has been interrupted.

Therefore, occupations of both the parent and the preterm infant must be understood and supported. The parental role is a most significant occupation and can be severely affected by the separation of parent and infant in the NICU. Parents may feel less confident in their parenting skills of a medically fragile infant. Parental stress may alter parents’ perception of their competence, parenting behavior and ultimately parent-infant attachment. The proposed program is designed to support parenting skills and promote confidence in handling their preterm infant through massage therapy. An important element of the program will include educating the parent on their infant’s behavioral signs of stress and how to respond to them adaptively. The program will educate parents on how to use massage therapy to promote a calming effect, improve parent confidence, and improve parent-infant attachment while supporting infants’ neurobehavioral development. Evidenced-based literature has shown massage therapy to be an effective intervention to decrease parental stress and improve parental confidence with preterm infants (Beachy, 2003; Feijo et al., 2006; Ferber et al., 2005; Ferber et al., 2002).

Preterm infants have their own unique occupations. These include responding to
environmental inputs, maintaining homeostasis, beginning social interactions with parents, and procuring nourishment to promote growth and development (Vergara et al., 2006). The proposed program takes into account and supports all of the aforementioned preterm infant occupations. Massage therapy has been shown to improve infant behavioral states and self-organization, improve heart rate variability, promote social interactions with parents through close proximity, touching and eye contact, and increase vagal activity and gastric motility for weight gain (Beachy, 2003; Diego et al. 2007; Feijo et al., 2006; Ferber et al., 2005; Ferber et al., 2002).

Educating Parents

A major component of the proposed program is an effective parental educational plan for preterm infant massage to facilitate understanding of key components, carryover of skills learned, and adherence to massage therapy protocols by parents. A meta-analysis of 77 published evaluations of parent training programs done by Kaminski, Valle, Filene & Boyle (2008) found that requiring parents to practice new skills with parent training sessions was consistently associated with larger effect sizes. The proposed program will consist of two hands-on training sessions with the parents. The first one-hour preterm infant massage training session will be done with a doll since the assumption is that the parents are already anxious about handling their medically fragile preterm infant. The parent will be given written educational materials with a low literacy level and encouraged to practice with the doll at home. The second one-hour training session will be completed with the parent performing massage therapy on their infant, and the OT will be present for guidance. At the end of the second session, it will be determined by the
parent and the OT if there needs to be further training or if the parent feels comfortable to continue to massage therapy on their own. A third, follow-up session will be completed to assess outcomes. Also a You-Tube video of preterm infant massage will be available to parents for reference.

Kamanski et al. (2008) also found that parent-training programs that promote positive parent and child interactions had larger effect size. It is speculated that the positive parent and child interactions increase parents’ confidence in their skills and the child’s interaction with the parent. Therefore, the parent will be more likely to continue the activity. The proposed program focuses on a positive parent-infant interaction to promote increased parental confidence in their role by adapting to their child’s unique needs. The program also supports infant-parent social interaction and synergy that improves infant-parent attachment. See Appendix C for the project Parent Education Model.

Furthermore, evidenced-based research suggests that early parent training of reducing stressful experiences for their preterm infants may improve brain development of the infants (Milgrom et al., 2010). In a randomized controlled trial of 45 women with infants less than 30 weeks gestation, parent sensitivity training of recognizing infant stress behaviors and how to optimize interactions, including massage, was shown to improve cerebral white matter development by magnetic resonance imaging post intervention and at term equivalence (40 weeks gestation) (Milgrom et al., 2010). The proposed program incorporates a key component of training parents how to recognize infant behavioral stress signs and respond adaptively using the Synactive Theory of
Development (Als, 1982). It also offers massage therapy as an optimal interactive activity between the parent and infant.

*Preterm Infant Massage Protocol*

A preterm infant massage therapy protocol has been researched in the literature through several randomized control trials and promotes moderate pressure stroking (Diego et al., 2005; Diego et al., 2007; Dieter et al., 2003; Field, Diego, Hernandez-Reif, Deeds & Figuereido, 2006). This protocol will be replicated in the proposed intervention of a preterm infant massage program with an occupational therapy approach. The protocol, as reported by Diego et al. (2007), consists of “5 minutes of tactile stimulation, 5 minutes of kinesthetic stimulation and then 5 subsequent minutes of tactile stimulation. During the tactile stimulation phase, the infant is placed in the prone position and massaged using moderate pressure (sufficient to produce slight indentation in the skin) over each region following this sequence: from the top of the head to the neck and back to the top of the head, from the neck across the shoulders and back to the neck, from the upper back to the waist and back to the upper back, from the thigh to the foot to the thigh on both legs, and from the shoulder to the hand to the shoulder on both arms. During the kinesthetic stimulation phase, infants are placed in the supine position and each arm then each leg and finally both legs together are flexed and extended as in a bicycling motion; each flexion/extension motion is 10 sec for a total of five, 1-minute segments” (p. 1588).

Inclusion criterion for the program is infants that are greater than 28 weeks gestation and weighing more than 1000 grams. The infants also must be medically stable including off respiratory support. Parents should visit their infant in the NICU at least 3 times a week.
and express an interest in the program. A physician's referral for the massage program is necessary. Please see Appendix D for the Preterm Infant Massage Program Participation Decision Model.

Conclusion

The proposed project is a parent educational program for preterm infant massage in the NICU with short-term goals of reducing parent and infant stress. Long-term goals include improving infant-parent attachment and infant neurobehavioral outcomes. The program will consist of hands-on training sessions of preterm infant massage with parents conducted by an occupational therapist certified in infant massage by an accredited infant massage training program. Written information will be provided at a low literacy level and a You-Tube video will be available for parental reference. The occupational therapist conducting the program will also need to have specialized knowledge of the medical complexities of preterm infants and understand the infant-parent dyad as it relates to the task and environmental contexts through the PEO model (Law, 1996). A massage protocol that has been established in several randomized controlled trials will be followed (Diego et al., 2007).
Chapter 4 – Evaluation Plan

The proposed program entails designing a preterm infant massage program with an occupational therapy approach. The intervention involves training parents of preterm infants in the neonatal intensive care unit (NICU) how to perform infant massage on their children through hands-on training sessions and educational material. The purpose of this program is to decrease the infants’ and parents’ stress perpetuated by the NICU environment. The program clients will be medically stable preterm infants that are greater than 28 weeks gestational age and weighing more than 1000 grams and their parents. Parents that visit their infants less than 3 times a week will be excluded. This program will be implemented at a Level IV NICU through the Occupational Therapy Department and funded by the hospital. A preterm infant massage program with an occupational therapy approach will be an effective intervention to address the problems that preterm infants and their parents face in regards to the NICU environment, infant-parent attachment, and overall neurobehavioral development.

Vision

Program evaluation is the systematic assessment of the processes and/or outcomes of a program with the intent of furthering its development and improvement (Newcomer, 2010). The preterm infant massage program is a new program that will be implemented in a large institute with several stakeholders seeking various levels of information from a program evaluation. The program evaluation will also be a valuable tool to confirm that the program is targeting the underlying problem of preterm infant and parental stress levels in the NICU environment. It is essential to do a program evaluation at the
initiation of the program to assist in clarifying program plans and objectives, improve communication among staff and stakeholders, and gather feedback needed to improve the program and provide accountability for program effectiveness (Newcomer, 2010). The program evaluation process will be done in a collaborative manner with key stakeholders and operational staff in order to design and implement an evaluation that is meaningful and useful to the intended information users. Through the program evaluation, key stakeholders can share their ideas about the strengths and weaknesses of the program, as well as, areas that may need to be changed. This information will be imperative to improve the support, acceptance, and effectiveness of the preterm infant massage program. Stakeholders should be engaged and involved in every step of the program evaluation to ensure the evaluation goals and design corresponds with the intended users’ goals and values.

**Key Stakeholders**

The key stakeholders for the preterm infant massage program are occupational therapists (OTs) implementing the educational program, parents receiving the education and carrying out the massage therapy, nurses that care for the infants in the NICU, medical doctors that will recommend which infants are medically appropriate for the massage program, the occupational therapy director who supervises the OTs, and the medical director of the NICU who will need to allocate budget money for the program. Each stakeholder is interested in different information from a program evaluation of a preterm infant massage program (e.g. parents will want to know if the program is safe and effective and the medical director will want to know if the program is cost effective).
Overall, for the initial program evaluation, the goals will be assessing the parents' satisfaction of the program design, the staff's perceived effectiveness of the program and the therapy director's and medical director's view of the program value. This will be accomplished using a parent satisfaction survey, a staff efficacy survey, and semi-structured interviews with the directors.

_Evaluability Assessment_

Evaluability assessment is a systematic process for analyzing the plausibility of achieving program evaluation objectives and acceptability to key stakeholders (Newcomer, 2010). Essentially, the role of an evaluability assessment is to examine the readiness of a program for evaluation. The plan for the evaluability assessment is to have a focus group of prospective parents who might utilize the massage program and a focus group of staff (nursing), prior to the start of the massage program. The goal of the focus group is to gather information about their perceptions and acceptance of a preterm infant massage program, as well as, the best ways to implement such a program within the NICU environment of care while ensuring parent participation. Clarification of the parents' and staff's goals for a program evaluation will be included during the focus group. Individual semi-structured interviews with the therapy director, the medical director, and other OTs in the NICU, will be implemented prior to the massage program initiation. The goal of the semi-structured interviews is to understand their perceptions of the massage program, their goals for the program and also, to understand their intended use of the program evaluation information. The focus groups and interviews with stakeholders will have two purposes: 1) to facilitate the logistic design of program
implementation by considering different values held by stakeholders and ensure their unique perspectives are understood; and 2) to support a credible evaluability assessment by identifying key stakeholders, intended users, intended use of the information and individual goals for a program evaluation.

The evaluability assessment team will include one to two occupational therapists involved in implementing the program, one to two nurses, one to two prospective parents, the medical director, and the therapy director. Supporting documentation will be brought to the group through good, quality research to support an understanding of the underlying problem: the NICU environment of care impacting the infants' and parents' stress levels and how the program addresses these issues with massage therapy while using an OT approach. Another piece of information that the group will need to understand is the cost of the program and how the program consumes budget funds from the NICU department and the OT department. Information of how other NICUs are implementing their infant massage programs for comparison will be presented, if such information is obtainable.

The first step for the group will be for each team member to identify their own program goals, objectives, and intended use of the information. There should be one person designated as the team manager to mediate between group members. This way the team can work towards focusing the evaluation design through advanced planning about where the evaluation is headed, and what steps it will take to get there.

**Logic Model**

An essential piece of information for the evaluability assessment team to review is a logic model of the program. A logic model is a planning tool that clarifies and
graphically organizes what a project intends to do and what it hopes to accomplish for clear communication to all intended information users. The logic model typically includes resources, outputs, outcomes, and external/environmental factors (See Appendix E for details). Please see Figure 1 for a representation of the logic model for a preterm infant massage program in Level IV NICU.

Core Purpose

The core purpose of a program evaluation serves as the basis for the design, methods, and use of the evaluation and should be clear throughout the process (Henry, 2010). The core purpose of the initial program evaluation or this program will be to gain insight about the practicality of a preterm infant massage program in the NICU. Thus, this portion of the program evaluation will be descriptive in nature to explore whether the program is operating as planned, provide feedback about the services offered, determine whether the program is producing the types of outputs and outcomes desired and clarify program processes, goals, and objectives. A Likert-type scale will be used with open-ended questions and suggestions for program changes in the parent satisfaction survey and the staff perceived efficacy survey; at the end of the program for the parents and at regular intervals for the staff. The parent satisfaction survey will be a post-test design, and the staff efficacy survey will be a repeated measures design on a quarterly basis. Thus, the parent satisfaction and staff perceived efficacy surveys can be part of the formative aspect of the program evaluation and both qualitative and quantitative data will be analyzed.

In addition, pilot relational data will be gathered on the new program through
repeat measures of outcome data in terms of infant and parental stress level.

Measurement of parental stress will be acquired using a self-report standardized measure called the Parental Stressor Scale: NICU (PSS:NICU) (Miles, Funk & Carlson, 1993). The PSS:NICU is a scale of 38 items that measures parental perceptions of stress arising from the physical and psychosocial environment of the NICU and focuses on sights and sounds, infant behavior and appearance, parental role alteration, staff communication, and overall stress of the NICU experience. The parent will be rating the level of stress that is caused by NICU environmental factors before (pre-test) the massage intervention and then after (post-test) the massage intervention; after 7 days. The parent will also record their stress level on a daily basis on a scale of 1-10. A trained observer will rate the infants’ stress using a researcher designed infant stress frequency scale (1-10) and will be performed daily. The Brazelton Neonatal Assessment Scale (BNAS) (The Brazelton Institute), will be performed monthly on the infants. The BNAS has 27 behavioral items and 20 elicited responses measuring a variety of areas including neurological, social, and behavioral aspects of newborn functioning. The trained observers for the BNAS will go through an already established training for BNAS administration given by the Brazelton Institute (www.brazelton-institute.com). At least two trained observers will be used and tested to improve inter-rater reliability. The trained observers for the researcher designed scale will go through training to identify preterm infant stress behaviors based on the Synactive Theory of Infant Development, which provides a framework for observing the behaviors of infants (Als, 1982). These trained observers will be rating the infants’ stress based on the infants’ behavioral state.
and heart rate variability measured by telemetry. All trained observers will be reviewing video recordings of preterm infants at the same designated time during the day; 2 minutes at the beginning of a 15 minute massage period, 2 minutes during and 2 minutes at the end. Measurement of infant and parent stress levels and how they respond to intervention will comprise the summative aspect of program evaluation and be based on rating systems that can be expressed quantitatively. Therefore, the program evaluation design will be a combination of formative and summative design using qualitative and quantitative data.

Evaluation Questions

The evaluation questions for the parent satisfaction survey and the staff efficacy survey will be different since the target audience perspective is different for each survey group. The following provides a description of each survey with sample items:

Parent satisfaction surveys- A Likert-type scale ranging from strongly agree (5) to strongly disagree (1). Sample items will include:

- The massage training is easy to understand.
- The training delivery matches my learning style.
- The time spent with hands-on training with an OT was sufficient.
- I was able to correctly perform the massage with my infant after I was trained.
- The written education material is easy to read/follow.
- I feel less stressed about handling my infant after the training.
- My infant seems less stressed after my massage.
There will also be open-ended questions such as:

- What do you like most about the massage program?

- What do you like the least?

- How would you change the program to make it better?

Please see Appendix F for the entire parent satisfaction survey.

*Staff program efficacy surveys:* A Likert-type scale ranging from strongly agree (5) to strongly disagree (1). Sample items will include:

- The massage program is client/parent-centered.

- The infants included are appropriate for the program.

- The massage program enhances the infant’s ability to cope with stress.

- Parents are more comfortable handling their infant after the training.

- Infants display fewer stress behaviors following massage with the parent.

- The massage program is easily implemented within the infants’ daily schedule.

Open-ended questions for the staff survey will be similar to the parent survey:

- What do you like most about the program?

- What do you like the least?

- How would you change the program to make it better?

Please see Appendix G for the entire staff program efficacy survey.
Figure 1. Preterm Infant Massage with an OT Approach: Logic Model

Program Clients
- Preterm infants > 28 weeks gestational age, weighing > 1000 grams, medically stable, admitted to NICU.
- Parents of preterm infants that visit their infants at least three times a week.

Nature of the Problem
Prematurity is the one of leading causes of infant morbidity. Overstimulation in the NICU causes stress in the infant and parent, deprives nurturing tactile experiences, and limits access by the parents impacting attachment.

Interventions and Activities
Education of parents about preterm infant massage to decrease stress for parent and infant.
Massage protocol: 2 times per day for 15 minutes, moderate pressure strokes & kinesthetic stimulation (flex/ext. of UEs and LEs).
Education of parents on how to read baby's cues and respond adaptively.

Short-Term Outcomes
- Infants: Decreased signs of behavioral stress by the infant, improved quality of touch experience for the infant.
- Parents: Decreased stress for the parent, improved confidence in handling a medically fragile infant.

Intermediate Outcomes
- Parents: Improved neurodevelopmental skills.

Long-Term Outcomes
- Improved infant-parent attachment.

Program Resources
Staffing: Two OTs, medical director, OT director, multiple MDs and NPs who would order the service when infant medically stable, nursing staff of ~ 80.
Funding: Through the hospital which collects payment from private insurance through DRG.
Facility: Level IV, fully equipped neonatal intensive care unit shared by all staff with room for 60 infants.

Program Theory
Based on the Dynamic Systems Theory of Development and Sensory Integration Theory: Infant massage in medically stable preterm infants decreases stress, increases weight gain and improves neurodevelopmental outcomes as supported in research.
Based on Attachment Theory: Infant massage has also been shown to increase depression/anxiety for mothers and improve infant-parent attachment as supported in research.

Program Outputs
- Number of infants/parents participating in the infant massage training
- Number of infant massage training sessions
- Number of OT staff trained and certified in infant massage
- Number of MDs and NPs willing to support the program by ordering the service for their preterm patients

External/Environmental Factors: (facility issues, economics, public health, politics, community resources, or laws and regulations)
1) Need for medical doctor/NP "buy-in" of program since it is ultimately their decision to recommend the program to parents,
2) Nursing turnover leads to lack of familiarity with the program,
3) Increasing number of preterm infants surviving at lesser gestational ages,
4) NICU environment can be a difficult environment physically to facilitate learning (distracting, over stimulating).
Both of these questionnaires will be available online or in paper format per the participants’ preference. The results of these questionnaires will be presented as a percentage distribution along with using the median rating response to each item across parents or staff members. This will be done using nonparametric statistics to analyze the ordinal data.

Scope

The scope of the evaluation will include the physical environment of a level IV NICU and include preterm infants greater than 28 weeks gestational age and weighing more than 1000 grams. Preterm infants that are not medically stable will be excluded as well as parents that do not visit their infant on a tri-weekly basis. The staff involved in implementing the program will be staff occupational therapists (2); nursing staff, which is approximately 80 (full and part time); and the medical doctors involved in recommending the program to prospective parents and infants. It is estimated that the program evaluation will involve at least 30-40 parents and infants to encompass the full scope of program outcomes and hopefully 30-40 nursing responses. The expected duration of the program evaluation would be approximately 6-12 months.

Data Management Plan

The data collection will be accomplished via a number of computer systems. The population characteristics for the infants will be collected through records already in place in the hospital electronic documentation system. Data for online surveys will flow from the client’s computer to the researcher’s computer through an online survey. If participants choose to complete a paper survey, this information needs to be entered by
the researcher into the computer program. A software program such as Microsoft Access will be used to categorize and help analyze the qualitative data. Quantitative data will be analyzed using Statgraphics Centurion XVII, which is a widely used statistical software package for exploratory data analysis, statistical modeling, design of experiments, time series forecasting, and quality improvement. The data for the Likert-type scale surveys will be ordinal data, and the focus group and interview data will be nominal. The trained observer data using the Brazelton Neonatal Assessment Scale, the PSS: NICU, and the researcher designed scale is ordinal data since there are no norms associated with the assessment for comparison. Thus, non-parametric statistics will be used such as correlation and contingency coefficients.

**Conclusion**

The program evaluation of a preterm infant massage-parent education program is essential to ensuring that this new program initiative is providing the best quality intervention while meeting key stakeholders objectives and goals. The goal of the program evaluation is to facilitate parent satisfaction, staff perceived efficacy and overall program outcomes. The seven steps of program evaluation are asking preliminary questions, diagramming program elements with a logic model, evaluability assessment, designing the evaluation, collecting data, analyzing data, and writing an effective report. Careful and detailed planning prior to and throughout a program evaluation process will help avoid pitfalls and facilitate reaching the intended users evaluation goals.
Chapter 5- Funding Plan

Premature birth disrupts important growth and development that occurs in the final months of pregnancy. The earlier an infant is born the more severe his or her health problems may be (Becket al. 2010). Many preterm infants require special care and spend weeks to months in the neonatal intensive care unit (NICU). The medical staff in the NICU provides life-saving treatments and medically complex intervention but the physical and psychological environment may have adverse effects on neurobehavioral development. Additionally, preterm infants may not have the developmental capacity to endure environmental stressors. Noises, bright lights, painful procedures and separation from the parent resulting in decreased nurturing touch are all factors that increase preterm infants stress and may negatively impact neurobehavioral development (Hellerud & Strom, 2002; Long, Philip & Lucey 1980; Scanlon, 1994). The parents of preterm infants also experience high levels of stress while their infant is being cared for in the NICU. Many parents report that the physical environment (noises, bright lights, & odors), sight of their own and other sick infants, and the loss of their expected parental role as major factors for stress (Franck, Cox, Allen & Winter, 2005).

Evidenced-based research supports the benefits of preterm infant massage including decreasing infant behavioral signs of stress and parental stress levels. For infants, preterm infant massage also may increase infant weight gain through improved gastric motility, decrease hospital stay, increase quiet sleep, and improve neurobehavioral development (Field, Diego & Hernandez-Reif, 2010). For parents, preterm infant massage increases positive infant-parent interactions, decreases depression and anxiety
after just one session, improves adaptation to their infant’s cues, and improves infant-parent attachment (Feijo et al., 2006).

This doctoral project is an educational program-for parents of preterm infants in the NICU on providing infant massage, reading their infant’s behavioral cues, and responding adaptively. The goals of the program are; (1) to help preterm infants decrease their behavioral signs of stress in the NICU environment, improve neurobehavioral development, increase weight gain, and facilitate positive infant-parent attachment, and (2) to help parents of preterm infants in the NICU decrease feelings of depression and stress, improve the ability to read their infant’s cues and confidence in their parenting skills, and facilitate positive parent-infant attachment. The program consists of hands-on training sessions with an occupational therapists certified in infant massage and with specialized knowledge of clinical practice in the NICU. A preterm infant massage protocol that has been established in several randomized controlled trials (RCTs) will be followed. Written educational material will also be provided with a low literacy level along with access to a YouTube video for reference.

Funding Plan Introduction

Creating a detailed funding plan is crucial to guide future implementation and dissemination of the proposed program of a preterm infant massage-parent education program in a NICU with an occupational therapy approach. This funding plan addresses three funding objectives (1) implementing the proposed program at a Level IV NICU, (2) providing educational services to assist neonatal therapists in developing a preterm infant massage therapy program, and (3) dissemination of program evaluation results. The first
The proposed program would be the acceptance and implementation of the program at a Level IV NICU. In this environment, the cost of implementing the program will be incurred by the hospital through the NICU budget for the occupational therapists (OTs) time, written educational materials and production of the YouTube reference video. Once the massage program at University of Rochester Medical Center, Golisano Children’s Hospital (URMC-GSC) is established; the next step for the project would be providing educational services to assist other neonatal therapists in developing a preterm infant massage program in their clinical practice. This would involve creating and providing a presentation that is relevant and informative for neonatal therapists interested in the program development process. Finally, the dissemination costs include presenting the program evaluation results at the annual American Occupational Therapy Association, the New York State Occupational Therapy Association, and the National Association of Neonatal Therapists conferences. These are highly respected conferences for occupational therapy and neonatal therapists. Budgets of needed resources and potential funding sources are described below for program implementation, providing educational services, and dissemination of program results.

**Budget of Needed Resources**

Three budgets are included in this funding plan (See Appendix H). The first budget ( Appendix H, Table 3) is for program implementation at a Level IV NICU, which includes the fee for the occupational therapists time and written material provided to the parent. Initially, the implementation budget will be slightly higher due to fees for the certification in infant massage for the occupational therapist (OT). Future services will
follow the same basic budget for the occupational therapists time and written materials with slight increases due to inflation for future implementation. The second budget (Appendix H, Table 4) is a fee schedule for providing educational services to neonatal therapists interested in developing a preterm infant massage for their own clinical practice. This fee schedule may also be subject to slight increases for inflation and competition in the future. The final budget (Appendix H, Table 5) covers dissemination of program results. The goal is that the dissemination plan will be implemented within 12 months after completion of this doctoral project. Dissemination of future program outcomes and evaluation results through poster presentations at conferences would follow the same basic budget with slight increases due to inflation.

*Program Implementation Costs*

The costs associated with the implementation of the proposed program are relatively low. The program uses a train-the-trainer model. That is, it is designed to utilize the parent as the “therapist” once the parent has been sufficiently trained to provide massage therapy while reading their infants’ behavioral cues and responding adaptively. The implementation budget has been created for two years since the first year will have additional costs for program development. One major cost would be the certification process for the occupational therapist as an infant massage instructor through an accredited program. This would be a one-time cost at the initiation of the program. There may be a point where hospital administrators decide to have another OT certified if it is warranted due to an increasing number of parents participating in the program. The time the OT spends with each parent for the hands-on training would be another major
area of costs. The program is designed for two, one-hour hands-on training sessions with
the parent but leaves room for more sessions if the parent or therapist prefers. A third cost
associated with implementation of the proposed program is the written educational
materials provided to the parent. There also will be several flyers displayed in the NICU
to promote the program to parents. Production of the YouTube reference video would be
the final cost associated with program implementation, but no additional costs are
anticipated. Most major hospitals have their own video camera that can be used for the
production of the video. The occupational therapist will create the script and perform the
video content using a doll. Uploading and maintaining a video on YouTube is free.
Therefore, the only anticipated cost is the therapist’s time writing the script and
producing the video.

Implementing the proposed program at a Level IV NICU means the budget
responsibility falls to the hospital and will be supported through the NICU department
budget. Therefore, the implementation costs for the proposed program must be approved
by the NICU medical director. There will be no cost to the parent since this service is
provided as part of their child’s NICU admission. The parent’s insurance company will
not be billed specifically for taking part in the program since hospital admission billing is
based on diagnostic related group (DRG) payments. DRG is a system to classify hospital
admissions into cases based on International Classification of Diseases (ICD) diagnoses,
procedures, age, sex, discharge status, and the presence of complications (Wikipedia,
n.d.). Therefore, insurance companies are not billed on a fee-for-service for a NICU
admission. Estimated costs for the first year of program implementation can be found in
Appendix H, Table 3. Subsequent years will follow the same basic budget of the therapist’s time and written materials with slight revisions for inflation.

**Educational Services Costs**

Educational services can be provided to other neonatal therapists interested in implementing a preterm infant massage program at their NICU. Educational sessions presenting evidenced-based information about training parents of preterm infant massage and the logistics of implementing the program while in the NICU will be offered. A fee of $275 would be set for each two-hour educational session. This would include printing costs of materials for up to 10 participants. An additional fee of $5 will be budgeted per extra attendees. The educational session could be offered in person locally or via web camera at a distance.

At this time, there are minimal additional costs anticipated for educational services. See Appendix H, Table 4 for budget specifics. The author’s personal resources will be utilized for educational services such as computer, printer, internet, web camera, microphone, and telephone. The anticipated cost will be for marketing educational services through mailings. Marketing will also be done through social media such as Facebook and LinkedIn, but there are no fees associated with them.

**Dissemination Costs**

Many dissemination activities can be completed without cost. For example, writing articles for journals and magazines, offering presentations, creating summary sheets, and blogging are done without additional budgeting required. For in-person dissemination of this project’s evaluation results, poster presentations at three annual
conferences are being considered (See Chapter 6). Costs for the poster presentations include conference registration fees (at presenter’s rate), round trip travel to conference locations, lodging and meals at the conference, and printing costs for the poster and handouts. See Appendix H, Table 5 for budgets details.

**Potential Funding Sources**

Typically, the activities outlined in the implementation of the program funding plan would be covered by the hospital NICU department budget. Certification of the OT implementing the program, the OTs time for implementation, the written materials, and the YouTube video production would be part of the NICU budget. Dissemination of the program evaluation results at the three annual conferences may be paid for by the NICUs annual budget. However, funding for these activities is not guaranteed and may be limited by department budget availability. For example, department budgets may only allow for limited educational funds such as certification course registrations, up to a yearly total (e.g. $500). This would not cover the travel and meal/lodging costs for the OT to become infant massage certified. Also, dissemination activities may be limited to conference registration fees only or not covered at all. In Table 1, potential funding sources are listed for the three components of this funding plan: program development and implementation, educational services, and program evaluation results dissemination.
Table 1. Funding Opportunities

<table>
<thead>
<tr>
<th>Funding Type</th>
<th>Funding Sources and Description</th>
<th>Implementation or Dissemination</th>
</tr>
</thead>
<tbody>
<tr>
<td>Federal Grant</td>
<td><strong>Eunice Kennedy Shriver National Institute of Child Health and Human Development #PA-12-207 Grant</strong> to develop and conduct short-term research education programs to improve the knowledge and skills of a broad-based community of biomedical and behavioral researchers conducting research on reproductive, developmental, behavioral, social, and rehabilitative processes that determine the health and well-being of newborns, infants, children, adults, families, and populations. The program should include both didactic and hands-on experiences. If appropriate, the program may include activities to disseminate course materials and instructional experience to the scientific community. This grant can be applied for electronically at <a href="http://grants.nih.gov/grants/guide/ApplyButtonSplash.cfm">http://grants.nih.gov/grants/guide/ApplyButtonSplash.cfm</a> and the deadline is 09/08/15. This grant awards $125,000 per year for up to 5 years.</td>
<td>Implementation Dissemination</td>
</tr>
<tr>
<td>Municipal Grant</td>
<td><strong>Greater Rochester Health Foundation Grant</strong> supports projects with maximum potential to positively impact the community’s health in the areas of prevention and health care delivery. Organizations within The Health Foundation’s service area (Genesee, Livingston, Monroe, Ontario, Orleans, Seneca, Wayne, Wyoming, and Yates Counties) with projects or initiatives of 1-3 years in duration. Submission of a letter of intent may go to <a href="mailto:slegette-sobers@thegrhf.org">slegette-sobers@thegrhf.org</a>. Proposal deadline is 09/09/13. The award amount is between $50,000 and $200,000 annually.</td>
<td>Implementation</td>
</tr>
<tr>
<td>Foundation Grant</td>
<td><strong>Little Giraffe NICU Support Grants</strong> in the amount of $50 - $1,000 to help NICUs make the experience of having a child in the neonatal intensive care unit (NICU) easier. Potential applicants can submit a Letter of Intent addressed to the Little Giraffe Funding Committee summarizing the proposed program. Letter of intent should be emailed to <a href="mailto:funding@littlegiraffefoundation.org">funding@littlegiraffefoundation.org</a> with the subject of “LGF NICU Support Funding Request”.</td>
<td>Implementation</td>
</tr>
<tr>
<td>Foundation grant</td>
<td><strong>Ronald McDonald House of Rochester, NY Grants Program</strong> supports projects and programs that improve the physical and behavioral health of children in the greater Rochester area. Grants are awarded to projects and programs that promote wellness, prevent illness, injury and disease, and provide quality care for children with acute or chronic illnesses or conditions. To be considered for funding, applicants must be 501(c) (3) organizations. URMC-GCH is a non-profit organization. You may apply online at <a href="http://www.rmhcrochester.org/community-grants/apply-online">http://www.rmhcrochester.org/community-grants/apply-online</a>. Awarded funding varies based on the program needs and funds available.</td>
<td>Implementation</td>
</tr>
<tr>
<td>Foundation grant</td>
<td><strong>Marie C. &amp; Joseph C. Wilson Foundation Grant Program</strong> supports projects that improve the quality of life of the Rochester citizens by creating a sense of belonging within the family and community. The Foundation will consider grant requests ranging from $1,000 to $25,000. Grant applications will be accepted on an ongoing basis. A review committee, composed of Foundation board members, will review applications as they are received. Online application can be found at <a href="https://www.grantinterface.com/Common/LogOn">https://www.grantinterface.com/Common/LogOn</a>.</td>
<td>Implementation</td>
</tr>
<tr>
<td>Foundation grant</td>
<td><strong>M&amp;T Bank Charitable Foundation</strong> for 501 (c) (3) organizations up to $10,000. The Foundation supports a diverse range of civic, cultural, health and human service organizations with financial grants, employee volunteerism and in-kind services. UMRC-GCH is a non-profit organization. The grant application can be found at <a href="https://www.mtb.com/aboutus/community/Documents/charitable-application.pdf">https://www.mtb.com/aboutus/community/Documents/charitable-application.pdf</a>.</td>
<td>Implementation</td>
</tr>
<tr>
<td>Hospital funding for conferences or certification</td>
<td>Apply for additional funds from the hospital to support practitioners’ attendance at academic conferences and infant massage certification.</td>
<td>Implementation</td>
</tr>
<tr>
<td>Personal Capital</td>
<td>Use monies from earned salary to fund dissemination activities at academic conferences and infant massage certification.</td>
<td>Implementation</td>
</tr>
</tbody>
</table>
Chapter 6-Dissemination Plan

The proposed program is an educational program for parents of preterm infants in the NICU of preterm infant massage through an occupational therapy lens. This program provides a holistic view of the problem and intervention as described in chapters 2 and 3, respectively. It encompasses evidenced-based strategies from developmental care, family-centered care, skin-to-skin contact, and preterm infant massage. Evidenced-based research suggests many benefits of preterm infant massage for infants and parents including increased weight gain, shorter hospital stay, improvement in mental and motor development, reduced parental stress and anxiety, and improved parental confidence (Ferber et al., 2005; Field, Diego & Hernandez-Reif, 2010). The proposed program also incorporates the person, environment, and occupation model (Law et al., 1996) in an attempt to encompass the interacting parts as a whole, complex phenomenon.

The program will include hands-on training for the parents, with an occupational therapist who specializes in neonatal care and is certified in infant massage, of a massage protocol that has been established in evidenced-based research including several randomized controlled trials. There will also be educational pamphlets written at a low-literacy level with clear directions and pictures for reference. Finally, a You-­Tube video will be created and available as a resource for parents. The massage therapy training will be designed to respect infants’ neurodevelopmental needs by educating parents on reading their infants behavioral signs of stress. The program will also facilitate parents’ ability to provide nurturing care for their preterm infant and promote infant-parent attachment and the confidence in the parental role.
The ultimate goals of this program are: (1) educate parents of preterm infants on preterm infant massage and infant behavioral signs of stress, (2) decrease preterm infant stress in the NICU and ultimately improve infant neurobehavioral development, (3) decrease parental stress and improve confidence in the parental role, and (4) inform health care providers and key stakeholders of the content and benefits of preterm infant massage with an occupational therapy approach.

**Dissemination Goals**

There are long-term and short-term dissemination goals for the program and they are listed below.

- **Long-term goal:** Program results will contribute to improving preterm infant neurodevelopmental skills and infant-parent attachment in the NICU using evidenced-based and holistic interventions.

- **Long-term goal:** Program results will provide education of the benefits of the proposed program to reduce stress for parents and infant in the NICU to health care providers and key stakeholders.

- **Short-term goal:** Program results will contribute to decreased overall preterm infant stress behaviors in the NICU environment of care.

- **Short-term goal:** Program results will contribute to decreased preterm infant hospital length of stay in the NICU.

- **Short-term goal:** Program results will contribute to decreased parental stress in the NICU and improve confidence in the parental role.
Target Audiences

- Primary Audience: The primary audience for the dissemination of this program evaluation is hospital administrators of NICUs to whom the program will be proposed and implemented, if it is accepted. The hospital administrators that have been identified as key stakeholders include the Chief Operating Officer, the NICU Medical Director, and the Director of the Occupational Therapy Department. Administrators may assess the evidence-based review, funding plan of the proposed program, and overall proposed program plans to guide a decision for the implementation of the program in their NICU. The goal is to educate administrators to the benefits and cost-effectiveness of the program in order to facilitate its acceptance and implementation.

- Secondary audiences: Secondary audiences for the dissemination of this program’s evaluation results include: neonatal therapists, other neonatal health care providers (neonatologists, nurse practitioners, neonatal nurses), and parents of preterm infants in the NICU.
  
  - **Neonatal therapists** may assess the evidenced-based literature of preterm infant massage provided by the parent and incorporate it into their own clinical practice. The goal is to enhance the therapeutic experience and effectiveness in the NICU for neonatal therapists, preterm infants and their parents.

  - **Other neonatal health care providers** may benefit from understanding the benefits of preterm infant massage and the overall
proposed program for preterm infants and parents. The goal is to enhance knowledge of NICU environmental stress and acceptance of interventions that can promote positive infant-parent experiences.

- **Parents** of preterm infants in the NICU may assess the evidence-based literature review and overview of the proposed program and use it to make informed decisions about interventions to reduce infant and parent stress in the NICU including this program. The goal is to promote the acceptance and implementation of this program by the parents through education.

**Key Messages**

**For Hospital Administrators of NICUs**

1. The evidenced-based literature suggests that preterm infant massage has many benefits for preterm infants and their parents including decreasing stress levels caused by the NICU environment of care. For preterm infants, massage therapy has been shown to decrease infant behavioral signs of stress increase weight gain, decrease hospital length of stay, and improve neurobehavioral development. For parents, providing massage therapy to their preterm infant has been shown to decrease stress and anxiety, improve infant-parent attachment and confidence in their parental role. The proposed program aims to educate parents on how to massage their preterm infants while in the NICU and has many benefits for the infant and the parents. The program may also benefit the hospital by
improving infant weight gain which is a main criterion for hospital discharge. Decreasing length of stay can save hospitals a substantial amount of money.

2. The benefits of preterm infant massage by the parent outweigh the cost since the parent takes over the massage therapy after two training sessions with a neonatal therapist, along with written educational material and a video; instead of a neonatal therapist performing massage therapy on a daily basis which would be much more costly. Also, evidenced-based literature suggests that preterm infant massage increases weight gain, which is one of the main criteria for preterm infant hospital discharge, and subsequently decreases hospital length of stay. Shorter hospital length of stays will provide another layer of cost-savings.

**Neonatal Therapists**

1. Exploring effective interventions to decrease stress for both preterm infants and their parents such as preterm infant massage can positively impact parental roles, infant-parent attachment, and infant neurobehavioral outcomes. Incorporating a preterm infant massage-parent education program in their own clinical practice can enhance the therapeutic process between the therapist, the infant, and the parent. Infant massage is an inexpensive tool that can be utilized as part of the therapeutic plan of care to reach infant and parent goals of reducing stress in the NICU. Consider beginning a massage therapy educational program
with hands-on training for parents that enhances the learning process. This should be coupled with educational materials written at a low level of literacy to improve generalization for various parental educational levels. Having a You-Tube video available for parents to reference will also enhance the learning process and improve parents’ confidence of their massage skills.

2. Consider using the massage therapy protocol of 15-minute sessions with 5-minutes of stroking, then 5-minutes of kinesthetic movement, and lastly 5 more minutes of stroking. This protocol has been established in evidenced-based research including several randomized controlled trials and is a key component of a preterm infant massage therapy educational program. Another key component of infant massage is using moderate pressure stroking. Evidenced-based research suggests that moderate pressure stroking is more effective versus light stroking in decreasing infant behavioral stress signs, improving heart rate variability, and increasing weight gain.

Other Neonatal Health Care Professionals

1. Consider a preterm infant massage therapy-parent education program as an effective intervention to decrease infant and parent stress while in the NICU. Infant massage provided by the parent can be beneficial to positively impact preterm infant quality of health outcomes. It can also improve parents comfort level with in the NICU and with
Parents

1. The NICU is a highly complex environment that provides necessary and complicated medical care for preterm infants. There have been many advances made in decreasing stress for infants and parents in the NICU, but the environment continues to be over stimulating for both. Many parents report loss of parental role as one of the major stressors. Current evidenced-based research supports that a preterm infant massage therapy-parent education program for preterm infants and their parents in the NICU may reduce infant and parent stress levels. Significant benefits of preterm infant massage for infants has been shown in the literature and include increased weight gain, improved developmental skills, and earlier discharge from the hospital. Parents of preterm infants also benefit because infant massage facilitates parent-infant attachment and improves confidence in their parenting skills. Consider learning preterm infant massage therapy while your infant is in the NICU to enhance your parental role, decrease your anxiety and stress, and improve your infant’s developmental outcomes.
Sources/Messengers

For Hospital Administrators of NICUs

- A presentation will be prepared and offered to NICU medical directors, OT directors and chief operating officers that include an executive summary of the proposed program, funding plan and summary article of the literature review findings. Medical Directors, Chief Operating Officers and Occupational Therapy Directors will be more likely to consider a new program that is based on evidenced-based literature and a well thought out program implementation plan including funding resources.

- NICU medical directors and chief operating officers utilize the International Neonatology Association as a credible source for evidenced-based literature and promotion of high standards of neonatal care. Leaders in occupational therapy such as the directors of hospital-based occupational therapy departments utilize the American Occupational Therapy Association (AOTA) as a credible source of evidenced-based information. Both would be ideal spokespersons for dissemination of this program's evaluation results to the hospital administrators of NICUs, especially those that do not have an established massage therapy program in the NICU. Information may be disseminated through these organizations' conferences, publications, and online resources.
For Neonatal Therapists

- Neonatal therapists include a growing number of occupational therapists. Occupational therapists look to the American Occupational Therapy Association for evidenced-based information about best practice. The National Association of Neonatal Therapists is another widely utilized resource of neonatal therapists. Both would be excellent spokespersons for this program’s evaluation results to neonatal therapists. Information may be disseminated through these organizations’ conferences, publications, and online resources.

For Other Neonatal Health Care Professionals

- Other neonatal health care providers such as doctors, nurse practitioners, and nurses consider accredited associations such as the International Neonatology Association and the National Association of Neonatal Nursing to be credible sources of effective interventions within the NICU environment. Information may be disseminated through these organizations’ conferences, publications, and online resources.

For Parents

- Most parents do not read evidenced-based research publications or attend neonatology/therapy conferences. Many parents of preterm infants in the NICU become a member of preterm infant support groups. *Preemies Today* is one of the largest parents of premature infant support groups in the northeast region of the United States, and is a trusted resource for
parents of preterm infants. Information may be disseminated through online blog postings, press releases, and conferences. Parents also use social media, such as Facebook, as a convenient resource. Information may be disseminated through a Facebook page created for parents of preterm infants who are receiving massage in the NICU.

Dissemination Activities

Written information

- A journal article summarizing the program evaluation results will be completed within one year of initiation of the program at one NICU and submitted to a peer-reviewed journal (e.g. *The American Journal of Occupational Therapy, The Journal of Neonatal-Perinatal Medicine*). This dissemination activity will share the results of the program evaluation and outcomes as they apply to neonatal interventions and neonatal therapists’ clinical practice.

- An article describing a preterm infant massage-parent education program with an occupational therapy approach in the NICU and the benefits of preterm infant massage for infants and parents will be completed and submitted to an occupational therapy trade magazine (e.g. *OT Practice, Advance for Occupational Therapy Practitioners*) after publication of a peer-reviewed journal article summarizing the program’s evaluation results.
- A presentation will be prepared that includes an executive summary of the proposed program, funding plan, and summary article of the literature review findings. This presentation will be offered to medical directors, OT directors, and chief operating officers of various NICUs including the University of Rochester Medical Center-Golisano Children's Hospital. This presentation will be videotaped so it can be posted for further viewing.

**Electronic Media**

- A summary sheet of findings from this program's evidenced-based literature review will be written and submitted to the American Occupational Therapy Association, the International Neonatology Association, the National Association of Neonatal Therapists, and the National Association of Neonatal Nursing after publication of a peer-reviewed journal article summarizing this program's evaluation results. The summary article is an excellent venue to share a singular perspective of the current state of the evidence regarding preterm infant massage benefits for reducing preterm infant and parental stress levels in the NICU through a parent educational program.

- A non-academic blog posting of the evidenced-based literature regarding the benefits of preterm infant massage for infants and parents in the NICU to reduce stress through a parent education program, following publication of a peer-reviewed journal article, will be submitted to *Preemies Today*.
parent support group. The intent of this article is to share with parents of preterm infants, one perspective of the current state of the evidence regarding preterm infant massage benefits for reducing preterm infant and parental stress in the NICU through a parent educational program.

**Person-to-person contact**

- A poster presentation will be submitted to the 2015 American Occupational Therapy Association conference and the New York State Occupational Therapy Association conference. The poster will investigate the benefits and utility of a parent educational program for preterm infant massage in the NICU with a holistic, occupational therapy approach. The poster will also be displayed at the University of Rochester Medical Center-Golisano Children's Hospital for viewing.

- A poster presentation will be submitted to the 2015 National Association of Neonatal Therapists conference. The poster will investigate the benefits and utility of a parent educational program for preterm infant massage in the NICU with a holistic, occupational therapy approach.

**Budget**

Most of the dissemination activities listed previously requires time commitments, but minimal financial resources. Estimated budgets to travel to present posters at the American Occupational Therapy Association, New York Occupational Therapy Association, and the National Association of Neonatal Therapists annual conferences are listed in Appendix H. Estimated budget items
include conference registration fees for presenters, travel expenses, lodging, and meal expenses. Estimated budget materials are poster and handout printing costs. The American Occupational Therapy Association conference and the New York State Occupational Therapy Association (NYSOTA) targets one of the primary audiences (Directors of Occupational Therapy Departments) and one of the secondary audiences (neonatal therapists). The National Association of Neonatal Therapists also targets a secondary audience (neonatal therapists).

Evaluation

Written information

- The acceptance of publication of a journal article by a peer-reviewed journal will indicate successful dissemination of information about this program. Further, feedback from article reviewers and readers will be used to evaluate the success of this method of information dissemination.

- The acceptance and deliverance of the presentation to NICUs will be considered successful dissemination of the information to the prospective medical directors, OT directors and chief operating officers. Also, the initiation of the proposed program will be an indication of successful dissemination of the information.

Electronic media

- Comments from readers of the summary article submitted to the American Occupational Therapy Association, the International Neonatology Association, the National Association of Neonatal Therapists, and the
National Association of Neonatal Nursing will be reviewed to analyze the success of this form of dissemination. Also, if any of the aforementioned associations track the number of times a summary article is accessed, then this information will be used to determine the success of dissemination.

- Comments from readers of the summary blog article submitted to Preemies Today will be reviewed to analyze the success of this form of dissemination. Also, if Preemies Today tracks the number of times a blog article is accessed, then this information will be used to determine the success of dissemination.

**Person-to-person contact**

- In order to evaluate the success of dissemination of information through this method, the number of attendees to poster presentations and the number of exchanges of contact information (i.e. email) for further discussion of the dissemination information will be tracked and used for follow-up.
Chapter 7- Conclusion

The focus of this doctoral project was to design a preterm infant massage-parent education program in the neonatal intensive care unit (NICU) with the goals of reducing infant and parent stress levels. The program was created using a holistic occupational therapy approach to support preterm infants’ and parents’ occupations. The intentions of evaluating the results of this project are to provide program design feedback and evidence about the benefits of preterm infant massage for infants and parents. The project’s results will contribute to three areas within occupational therapy: (1) addressing the specific needs of preterm infants and their parents (Cifra & Sancho, 2004; Ferber et al., 2002; Field, Diego & Hernandez-Reif, 2010; Mathai, Fernandez, Mondkar & Kanbur, 2001), (2) providing more evidence-based practice with this client population (AOTA, 2007; Franck, Cox, Allen & Winter, 2005; Hernandez-Reif, Diego & Field, 2007), and (3) build a more diverse occupational therapy profession (AOTA, 2007).

In the following chapter, this project’s innovative contributions to the occupational therapy profession will be discussed. First, a description of how theory and evidence were integrated from occupational therapy, neonatology, and psychology literature to design the program is provided. Next, a brief description of the preterm infant massage program as one possible way to address the needs of preterm infants and their parents in the NICU environment is discussed. Finally, the implications of this project on occupational therapy practice are considered.
Theory Integration

Theories from occupational therapy and psychology were considered and selected from each field to provide the framework for this project. First, Dynamic Systems Theory of Development (Thelen, Ulrich & Wolff, 1991) and The Person-Environment-Occupation Model (Law et. al, 1996) were compared and integrated to provide a focus on the interactions of preterm infants and their parents within the environmental and task contexts. Second, Sensory Integration Theory (Ayers, 1972) and Synactive Theory of Development were also compared and integrated to provide a focus on the negative impact of varied and noxious stimuli, which is prevalent in the NICU environment of care, on preterm infants’ neuro-integrative efficiency. Sensory Integration Theory (Ayers, 1972) also provides a framework for the positive effect of moderate pressure stroking, used in the preterm infant massage therapy protocol, on reducing infant stress levels. Synactive Theory of Development was utilized to provide the foundation for educating parents on how to read their infant’s unique behavioral cues and respond adaptively. Third, Attachment Theory (Ainsworth, 1979) was considered and integrated in the project to provide a focus on the cause of parental stress in the NICU environment of care due to separation from their infant and a loss of their parental role. Attachment Theory (Ainsworth, 1979) also provides the framework for the positive impact of parents providing preterm infant massage therapy on the parents’ stress and improving confidence of their parental skills and ultimately infant-parent attachment. An explanatory model was created to describe the relationship between preterm infants, their parents, the NICU environment of care, and the program (See Appendix A). Comparison
of the explanatory model with the occupational therapy, neonatology, and psychology literature supports the model’s elements and relationships.

**Evidence-Base Integration**

Exploration of evidenced-based literature for this project was guided by two questions: (1) What evidence exists that supports the effectiveness of interventions for preterm infants in the NICU to decrease their level of stress and that of their parents? and (2) What evidence exists to support the benefits of preterm infant massage for infants and parents? This exploration yielded a synthesis of best practice in designing a preterm infant massage-parent education program in the NICU with an occupational therapy approach. The literature indicates that incorporating individualized infant development considerations, skin-to-skin contact with moderate pressure massage provided by the parent, and family-centered care supporting the infant-parent dyad and the parental role improves both preterm infant and parental stress levels (Als et al. 2003; Feldman, Eidelman, Sirota & Weller, 2002; Newnham, Milgrom & Skouteris, 2009; Roller, 2005; Van der Pal et al., 2007). The literature also indicates that preterm infant massage improves neurobehavioral outcomes for infants; and when provided by the parent, improves infant-parent attachment (Ferber et al., 2005; Field et al., 2010).

**Program Description**

A preterm infant massage-parent education program was created to include the aforementioned evidence-based practice elements. The program includes hands-on training with a pediatric occupational therapist certified in infant massage, written
educational material with the specific step-by-step protocol geared toward a low literacy level (See Appendix B), and a YouTube video available for parents’ reference.

Throughout the preterm massage therapy training program, the parent will be educated on understanding their infant’s stress signs, evaluating stressful factors in the NICU environment for the infant and themselves, and strategies to decrease stress for the infant and themselves. The preterm infant massage therapy program through an occupational therapy approach is designed to enhance parent sensitivity and understanding of their preterm infant’s unique needs and to encourage the use of well-researched early intervention techniques.

Implications for Occupational Therapy

This project has important implications for occupational therapy and neonatology. First, preterm infant massage provided by the parent may decrease infant and parent stress levels in the NICU environment (Ferber et al., 2005; Field et al., 2010; Franck et al., 2005; Smith, Lux, Haley, Beachy & Moyer-Mileur, 2013). Second, decreasing preterm infant stress may improve neurobehavioral outcomes including motor and cognitive development (Field et al., 2010). Third, decreasing parental stress improves parents’ confidence in their skills and infant-parent attachment (Newnham et al., 2009). Finally, preterm infants and their parents in the NICU is a growing client population for occupational therapy practitioners and this project provides a best practice model for addressing this population’s unique needs.

In conclusion, this innovative program provides one example of how to address the problem of stress for preterm infants and their parents in the NICU environment of
care using evidence-based practice. If a preterm infant massage program with an occupational therapy approach were used with stable preterm infants in the NICU, it can have an impact on both qualitative and quantitative changes in preterm infant and parental stress, preterm infants’ neurodevelopment, as well as infant-parent attachment. As such, this program provides an innovative example of utilizing evidenced-based practice to support the needs of a growing occupational therapy client population.
Preterm birth:
1) Before 37 weeks of gestation
2) Low and very low birth weight

- Incidence of Infant Morbidity e.g. developmental disability
- Physiology e.g. weight gain
- Growth and Development
- Stressful situations i.e. painful procedures, loud noise, bright lights
  - Decreased nurturing touch
- Less opportunity for infant-parent bonding
- NICU Environment
  - Parental role and attachment
  - Preterm Infant Massage Program with an Occupational Therapy Approach
Summary of the Origin of the Problem

Children born preterm are at increased risk of both neonatal morbidities and developmental delays in early childhood (Petrini et al., 2009). Physiological elements such as weight gain have a mediating impact on infant morbidity and ultimately growth and development. Therefore, interventions that promote weight gain for preterm infants may decrease infant morbidity and improve growth and developmental outcomes. In the NICU environment, preterm infants are exposed to painful and stressful experiences. Preterm infants can show marked changes in physiological elements during stressful procedures such as changes in oxygen levels and cerebral blood flow (Maroney, 2003). Preterm infants in the NICU are deprived of nurturing touch experiences as well as bonding experiences with parents because of their medical fragility. Thus, the NICU environment of care may have a moderating effect on infant morbidity and ultimately growth and development. Preterm infant massage-parent education with an occupational therapy approach is explored as an effective intervention for this problem to promote positive outcomes in growth and neurobehavioral development of preterm infants while mutually explored as an effective intervention to support parental role confidence and parent-infant attachment for parents of preterm infants.
Appendix B: Preterm Infant Massage Parent Handout (Example)

1. Instructions For Massage Program
   - There must be a doctor's order to be in the massage program.
   - You will need to sign a consent form if you wish to be part of a study.
   - The occupational therapist will contact you to make the first appointment.
   - Each training session will last about an hour.
   - There will be at least three sessions but more can be added if you like.
   - You will need to bring a doll to the first appointment to practice massage.
   - One or both parents can participate.

2. What The Training Includes
   - One, one-hour hands-on training session with an occupational therapist certified in infant massage
   - One, one-hour follow-up session where the OT will observe the parent providing massage therapy to provide reinforcement (more sessions may be added)
   - One follow-up visit
   - A YouTube digital video available for parents’ reference
   - Written educational material with step-by-step directions

3. Benefits of Preterm Infant Massage
   - Fewer infant signs of stress such as less crying, sleeping more
   - Increased weight gain for infants
   - Improved developmental skills
• Shorter hospital stay
• Decreased parent anxiety after just one session
• Improved parenting confidence
• Improved infant-parent bonding

4. Preterm Infant Massage Directions

• Sessions are 15 minutes each, 2 x a day
• Use firm strokes (slight indentation in the skin)
• You may apply a small amount of oil if desired.

Step One

a. Lay your baby on his/her tummy.

b. Massage from the top of your baby’s head down the neck and back up for one minute.

c. Massage from the upper back to the waist and back up for one minute.

d. Massage from the thigh to the foot and back to the thigh on each leg for one minute.

e. Massage from the shoulder to the hand and back to the shoulder on each arm for one minute.

Step Two

a. Lay your baby on his/her back.

b. Bend and straighten one of your baby’s arms slowly for one minute.

c. Bend and straighten your baby’s other arm slowly for one minute.

d. Bend and straighten one of your baby’s legs slowly for one minute.
e. Bend and straighten your baby’s other leg slowly for one minute.

f. Bend and straighten both of your baby’s legs together, slowly for one minute.

Step Three

a. Repeat all of Step One

5. Reading Your Baby’s Signs

- Your baby may be stressed if he/she:
  - Goes limp
  - Becomes frantic
  - Spreads fingers wide apart
  - Locks arms and legs in a straight position
  - Looks panicked
  - Looks away from you often
  - Is glassy-eyed or staring ("tuning out")

- What to do if your baby seems stressed:
  - Be sure to wait one hour after a feeding to start massage. Your baby will be less likely to spit up.
  - Slow the pace of the massage.
  - Take a break from the massage.
  - Turn down lights.
  - Remove objects from your baby’s space.
  - Reduce noise level around your baby.
  - Swaddle your baby in a blanket.
- Offer a pacifier.
- Use blanket rolls to put your baby in a fetal position.
- Once the infant appears more stable, the massage can resume.

You may access the YouTube video for further preterm infant massage instructions at:

Please contact the occupational therapist if you have any questions:

Julie A Kunisch, OTR/L 275-1983
Appendix C: Preterm Infant Massage Program
Parent Education Model

A major component of the proposed program is an effective parental educational plan for preterm infant massage to facilitate understanding of key components, carryover of skills learned, and adherence to massage therapy protocols by parents. A meta-analysis of 77 published evaluations of parent training programs done by Kaminski, Valle, Filene & Boyle (2008) found that requiring parents to practice new skills with parent training sessions was consistently associated with larger effect sizes. Kamanski et al. (2008) also found that parent training programs that promote positive parent and child interactions had larger effect size. It is speculated that the positive parent and child interactions increase the parent's confidence in their skills and the child's interaction with the parent. Therefore, the parent will be more likely to continue the activity. The assumption of this doctoral project is that educating parents through guided participation and written materials will have a positive impact on parents' confidence in their parenting skills and ultimately enhance infant-parent attachment.
Appendix D: Preterm Infant Massage Program

Participation Decision Model

Is the infant more than 28 weeks gestation?

Yes          No ——> No referral

Does the infant weight more than 1000 grams?

Yes          No ——> No referral

Is the infant off of respiratory support?

Yes          No ——> No referral

Does the parent visit at least three times a week?

Yes          No ——> No referral

Does the parent express interest in the massage program?

Yes          No ——> No referral

Physician referral to Massage Program
Appendix E: Evaluation Plan Logic Model

**Problem Statement:** The neonatal intensive care unit presents multiple stressful elements for preterm infants and their parents that negatively impacts neurodevelopmental outcomes and infant-parent attachment.

**Goal:** This program is designed to educate parents how to perform preterm infant massage with their infant, read their infants' behavioral cues and respond adaptively in order to decrease preterm infant and parents' stress levels.

**Rationale:** By educating parents how to perform preterm infant massage, read their infants' behavioral cues, and respond adaptively; the infants will show decreased signs of stress and improved neurobehavioral development. The parents will feel less stressed and more confident in their parental role. This will ultimately improve infant-parent attachment.

**Assumptions:** Moderate pressure stroking with kinesthetic input through preterm infant massage improves preterm infant stress responses, gastric motility and weight gain, and neurobehavioral outcomes. Infant massage improves parent-infant interactions, decreases parental stress in the neonatal intensive care unit, and improves parents' confidence in their parental role. Early intervention parent training programs that promote positive parent-child interactions increase infant-parent synergy.

**External Factors:** The success of a preterm infant massage program in a neonatal intensive care unit may be affected by many external factors including (1) Medical doctors' "buy-in" of the program since it is based on physician referral, (2) Nursing turnover may lead to lack of familiarity of the program, (3) Increasing number of preterm infants surviving at lesser gestational age with more complex co-morbidities, (4) The neonatal intensive care unit can be a difficult environment to facilitate learning due to the overstimulation, and (5) Health care changes may affect budgetary resources.
<table>
<thead>
<tr>
<th>Resources</th>
<th>Intervention</th>
<th>Outputs</th>
<th>Short Term Outcomes</th>
<th>Intermediate Outcomes</th>
<th>Long Term Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Staffing:</strong> Two OTs, medical director, OT director, multiple MDs, nursing staff</td>
<td>- Education of parents about preterm infant massage to decrease stress for parent and infant. - Massage protocol: 2 times per day for 15 minutes, moderate pressure strokes &amp; kinesthetic stimulation (flex/ext of UEs and LEs).</td>
<td>- Number of infants/parents participating in the infant massage training - Number of infant massage training sessions - Number of OT staff trained and certified in infant massage - Number of MDs and NPs willing to support the program by ordering the service for their preterm patients</td>
<td><strong>Infants:</strong> Decreased signs of behavioral stress by the infant, Improved quality of touch experience for the infant. <strong>Parents:</strong> Decreased stress for the parent, Improved parental confidence in handling a medically fragile infant</td>
<td><strong>Infants:</strong> Improved weight gain, increased quiet alert state, reduced hospital stay <strong>Parents:</strong> Improved infant-parent attachment</td>
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<tr>
<td><strong>Funding:</strong> Through the hospital which collects payment from private insurance through DRG</td>
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<td><strong>Facility:</strong> Level IV, fully equipped neonatal intensive care unit shared by all staff with room for 80 infants.</td>
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Appendix F: Parent Satisfaction Survey

Preterm Infant Massage Program Evaluation

**INSTRUCTIONS:** Please rate how strongly you agree or disagree with each of the following statements by placing a check mark in the appropriate box.

1=Strongly Disagree  2= Somewhat Disagree  
3= Undecided     4=Somewhat Agree  5= Strongly Agree

<table>
<thead>
<tr>
<th>Question</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
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</thead>
<tbody>
<tr>
<td>1  The massage training is easy to understand.</td>
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<td>2  The training delivery matches my learning style.</td>
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<td>3  The time spent with hands-on training with an OT was sufficient.</td>
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<td>4  The instructor demonstrated the massage strokes clearly.</td>
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<td>5  It was difficult to schedule massage training with an OT.</td>
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<td>6  The written material was easy to read/follow.</td>
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<td>7  I feel less stressed about handling my infant after the training.</td>
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<td>8  I found the YouTube video to be helpful.</td>
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<td>9  My infant seems less stressed after my massage.</td>
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<td>10 I was able to correctly perform massage with my infant after I was trained.</td>
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<td>11 The program was not organized very well.</td>
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<td>12 I would recommend the massage program to other parents in the NICU.</td>
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<td>13 Overall, I am satisfied with the massage program.</td>
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</table>
What do you like most about the massage program? ____________________

What do you like least? ____________________________________________

How would you change the program to make it better? ________________
Appendix G: Staff Efficacy Survey

Preterm Infant Massage Program Evaluation

INSTRUCTIONS: Please rate how strongly you agree or disagree with each of the following statements by placing a check mark in the appropriate box.

1=Strongly Disagree  2= Somewhat Disagree  
3= Neither Agree nor Disagree  
4=Somewhat Agree  5= Strongly Agree

<table>
<thead>
<tr>
<th>Question</th>
<th>1</th>
<th>2</th>
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<th>4</th>
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<tbody>
<tr>
<td>1 The massage program is client/parent-centered.</td>
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<td>2 The instructor is prompt for the massage sessions.</td>
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<td>3 The massage program enhances the infants' ability to cope with stress.</td>
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<td>4 The infants included are appropriate for the program.</td>
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<td>5 The massage protocol is not followed consistently.</td>
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<td>6 Parents are more comfortable handling their infant after the training.</td>
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<td>7 The massage program is easily implemented within the infants’ schedule.</td>
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<tr>
<td>8 The instructor demonstrates the massage strokes effectively.</td>
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<td></td>
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<td></td>
</tr>
<tr>
<td>9 Infants display fewer stress behaviors following massage with the parent.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10 Parents consistently continue massage therapy with their infants once training is complete.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11 The educational handouts are easy to read and follow.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12 Overall, I am satisfied with the massage program.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13 I would recommend this program to families in the NICU.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
What do you like the most about the massage program? _______________________

_______________________________________________________________________

What do you like the least? _____________________________________________

_______________________________________________________________________

How would you change the program to make it better? _________________
Appendix H: Implementation and Dissemination Budgets

Table 3. Program Implementation Costs

<table>
<thead>
<tr>
<th>Budget Item</th>
<th>Year One</th>
<th>Year Two</th>
</tr>
</thead>
<tbody>
<tr>
<td>Infant Massage certification registration</td>
<td>$550</td>
<td>$0</td>
</tr>
<tr>
<td>Travel for certification of a course within NYS</td>
<td>$100</td>
<td>$0</td>
</tr>
<tr>
<td>Lodging and Meals</td>
<td>$500</td>
<td>$0</td>
</tr>
<tr>
<td>Therapists' part time salary for massage program (estimated 10 hours a week)</td>
<td>$19,000</td>
<td>$19,000</td>
</tr>
<tr>
<td>Written materials (educational handouts, flyers)</td>
<td>$20</td>
<td>$20</td>
</tr>
<tr>
<td>Dissemination cost</td>
<td>$3,790</td>
<td>$3,790</td>
</tr>
<tr>
<td>Total</td>
<td>$23,960</td>
<td>$22,810</td>
</tr>
</tbody>
</table>

*An additional cost of $1150 may need to be added after the first year if another occupational therapist needs to be certified as the program grows.

Table 4. Educational Services Fees

<table>
<thead>
<tr>
<th>Service</th>
<th>Fee</th>
</tr>
</thead>
<tbody>
<tr>
<td>Educational Session</td>
<td>$275 (10 participants)</td>
</tr>
<tr>
<td>Additional printing costs</td>
<td>$5 per participant above 10</td>
</tr>
</tbody>
</table>

*Personal computer, internet, printing supplies, telephone and web camera will be utilized for the educational services budget.
Table 5. Dissemination Costs

<table>
<thead>
<tr>
<th>Budget Item</th>
<th>AOTA conference</th>
<th>NANT conference</th>
<th>NYSOTA conference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conference registration</td>
<td>$400</td>
<td>$550</td>
<td>$100</td>
</tr>
<tr>
<td>Poster Printing &amp; shipping</td>
<td>$100</td>
<td>$100</td>
<td>$100</td>
</tr>
<tr>
<td>Handout printing</td>
<td>$15</td>
<td>$15</td>
<td>$10</td>
</tr>
<tr>
<td>Travel</td>
<td>$500</td>
<td>$500</td>
<td>$100</td>
</tr>
<tr>
<td>Lodging and Meals</td>
<td>$500</td>
<td>$500</td>
<td>$300</td>
</tr>
<tr>
<td>Total</td>
<td>$1,515</td>
<td>$1,665</td>
<td>$610</td>
</tr>
</tbody>
</table>
Appendix I: Executive Summary for Reducing Stress in the Neonatal Intensive Care Unit: A Preterm Infant Massage Program with an Occupational Therapy Approach

Preterm infants and their parents in the neonatal intensive care unit (NICU) are a growing client population for health care providers including occupational therapists. Preterm infants in the NICU receive complex medical care and are often subjected to extremely stressful situations such as loud noises, bright lights, and painful procedures. The NICU environment of care also presents multiple stressful elements for parents of preterm infants and has been well-documented in the literature (Dudek-Schriber, 2004; Miles & Frauman, 1993; Miles & Holditch-Davis, 1997). Three major sources of stress for them, as reported by Franck, Cox, Allen & Winter (2005), are the physical environment, sight of their ill infant, and loss of their expected parental role as being the most significant. Evidenced-based literature suggests that infant massage has many benefits for preterm infants in the NICU and their parents including reducing stress levels (Diego et al., 2007; Field, Diego, Hernandez-Reif, Deeds & Figuereido, 2006; Hernandez-Reif, Diego, & Field, 2007). Other benefits for preterm infants includes increased weight gain, shorter hospital stay, fewer infant behavioral signs of stress, and improvement in cognitive and motor development (Field, Diego, & Hernandez-Reif, 2010). Following intensive care treatment, weight gain becomes the main criterion for hospital discharge and preterm infants that receive massage therapy have hospital stays that are 3-6 days less than control infants (Diego, Field & Hernandez-Reif, 2005; Dieter, Field, Hernandez-Reif, Emory & Redzepi, 2003). Research on the benefits of preterm infant massage on parent stress levels is limited and needs more rigorous study. However,
research on preterm infant massage therapy by the mother is suggested to improve mother-infant interactions and decrease parental stress immediately and at three months of age in two randomized controlled trials (Feijo et al., 2006; Ferber et al., 2005). Ferber et al. (2005) found that preterm infant massage facilitated more maternal competence, positive affect, and adaptation to infant cues at 3 months of age. Despite these reported benefits, infant massage is only practiced in 38% of NICUs in the United States (Field et al., 2010). This may be related to the underlying mechanisms not being well understood, lack of motivation by the therapist to be certified, and/or cost effectiveness considerations. This project was developed as an innovative response to the identified practice need.

This project focused on: (1) identifying evidenced-based literature to support the benefits of preterm infant massage for both the infant and the parent, (2) investigating evidence and best practice in designing a preterm infant massage-parent education program in the NICU that supports the infant-parent dyad, (3) providing an overview of best practice for implementing a preterm infant massage parent education program in the NICU, and (4) describing detailed evaluation and dissemination plans of the results including estimated budgets for their implementation. Theory and evidence from occupational therapy, massage therapy, psychology, and neonatology were integrated to develop a preterm infant massage parent education program in the NICU.

*Project Overview*

Many studies on reducing stress in the NICU for preterm infants and parents focus on individualized developmental care, skin-to-skin contact, family-centered care
and, infant massage as separate interventions (Als et al., 2003; Chiu & Anderson, 2009; Cifra & Sancho, 2004; Ferber et al., 2005; Newnham, Milgrom & Skouteris, 2009).

Instead, this project focused on incorporating all of the aforementioned interventions into one holistic preterm infant massage therapy program for reducing infant and parent stress levels. This intervention was intended to accommodate each preterm infant-parent dyads’ unique needs. It was developed to promote parents confidence in reading their infants’ behavioral cues and adapting to their infants’ unique needs while participating in a nurturing and comforting activity; massage. The goals of the program are to (1) decrease preterm infant behavioral signs of stress, (2) decrease parent stress levels, (3) improve overall neurobehavioral development, and (4) improve infant-parent attachment.

First theories from occupational therapy (i.e. Sensory Integration; Ayers 1972; Person-Environment-Occupation; Law et al., 1996) and developmental psychology (i.e. Dynamic Systems Theory of Development; Thelen & Ulrich, 1991; Attachment Theory; Ainsworth, 1979) were selected to frame the identified problem and the project development. All of these theories focus on three important elements for this project: the infant and parent, the experiences of both, and the NICU environment. All of these theories consider how all three elements interact with each other. These considerations were critical to frame a project that was intended to provide individualized parent training of massage therapy and reading their infants’ cues while supporting each infant’s and parent’s unique needs.

Next, evidence from the neonatology, massage therapy, and psychology literature was reviewed to design the preterm infant massage parent education program in the
NICU. First, a preterm infant massage protocol that has been established in randomized-controlled trials was identified (Diego et al., 2005; Diego et al., 2007; Dieter et al., 2003; Field et al., 2006). This protocol was incorporated into the project and consists of 15 minute sessions, 2 x a day; 5 minutes of tactile stimulation; 5 minutes of kinesthetic stimulation; and then 5 minutes more of tactile stimulation. The tactile stimulation phases are done in prone using moderate pressure stroking (sufficient to produce slight indentation in the skin). Moderate pressure massage therapy is a key component to the preterm infant massage protocol. Evidence-based research has noted that moderate pressure therapy is more effective to improve weight gain and heart rate variability than light pressure therapy for full term and preterm infants (Diego et al., 2005; Field et al., 2004).

Second, current effective methods to reduce infant and parent stress in the NICU were incorporated into the project. Individualized Developmental Care based on Als’ (1982) Synactive Theory of Development provides the framework for the conceptualization of preterm infants’ neurobehavioral organization capabilities. Parent education of how to identify their infant behavioral stress signs and how to respond appropriately is included in this project. Skin-to-skin contact is another well researched method of decreasing preterm infants’ and their parents’ stress levels in the NICU.

Another key element of the preterm infant massage program is training parents how to effectively provide skin-to-skin contact with their infant through massage techniques. Family-Centered Care in the NICU strengthens parents’ knowledge about their preterm infant and their own parenting role and has been shown to decrease parental negative mental health outcomes during the NICU stay and post discharge (Melnyk et al., 2001;
Melnyk et al., 2006; Newnham et al., 2009). Also, there is evidence suggesting it is possible to improve parent-infant interaction through parent training programs that involve teaching positive parent-infant interaction skills and requiring parents to practice the skills during program sessions (Centers for Disease Control, 2009; Newnham et al., 2009). This project was developed with family-centered care in mind and teaches positive parent-infant interactions.

Finally, evidence from the education literature was reviewed to facilitate the method of parent training. A meta-analysis of 77 published evaluations of parent training programs done by Kaminski, Valle, Filene & Boyle (2008) found that requiring parents to practice new skills with parent training sessions was consistently associated with larger effect sizes. Kamanski et al. (2008) also found that parent training programs that promote positive parent and child interactions had larger effect size. It is speculated that the positive parent and child interactions increase the parent’s confidence in their skills and the child’s interaction with the parent. Therefore, the parent will be more likely to continue the activity. The preterm infant massage parent education program consists of:

- One, one-hour hands-on training session for parents, using a doll, with an occupational therapist certified in infant massage.
- One, one-hour session where the OT will observe the parent providing massage therapy to provide reinforcement (more sessions may be added if the parent or OT requests).
- One follow-up visit to assess outcomes
- A YouTube digital video available for the parents’ reference.
• Written educational material with the specific step-by-step protocol, infant signs of stress, and suggestions for parental responses geared toward a low literacy level.

**Funding Sources**

The first step for the proposed program would be the acceptance and implementation of the program at a Level IV NICU. In this environment, the cost of implementing the program will be incurred by the hospital through the NICU budget for the occupational therapists time, written educational materials, and production of the YouTube reference video. Therefore, the implementation costs for the proposed program must be approved by the NICU medical director. There will be no cost to the parent since this service is provided as part of their child’s NICU admission. However, other potential funding opportunities have been explored through this project. These opportunities include federal research grants through Eunice Kennedy Shriver National Institute of Child Health and Human Development, municipal grants through Greater Rochester Health Foundation, and foundation grants through Little Giraffe NICU Support, Ronald McDonald House of Rochester, NY, Marie C. & Joseph C. Wilson Foundation, and M&T Bank Charitable Foundation.

**Conclusion**

In summary, this innovative preterm infant massage-parent education program provides one example of how infant massage can be incorporated in the NICU with a goal of reducing stress levels for infants and parents. The qualitative and quantitative benefits of this program may outweigh the cost incurred by the hospital (Field et al.,
In addition, this project provides neonatal therapists with a foundation for designing a preterm infant massage-parent education program with their client population and provides a model for best practice. Finally, this program's design and evaluation plan may contribute to the larger body of knowledge about preterm infant massage programs in the NICU. Therefore, this program provides an innovative example of promoting preterm infant massage with a holistic occupational therapy approach in the NICU to promote positive neurobehavioral outcomes and infant-parent attachment.

References for Appendix I


References


