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# Infant Positioning and Its Effect on Development and Head Symmetry

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Infant Positioning and its Effect on Development and Head Symmetry

by

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Submitted to the Occupational Therapy Department

of the

University of North Dakota

In partial fulfillment of the requirements

for the degree of

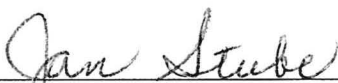
Master's of Occupational Therapy




Grand Forks, North Dakota

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This Scholarly Project Paper, submitted by Marjorie Dvorak in partial fulfillment of the requirement for the Degree of Master's of Occupational Therapy from the University of North Dakota, has been read by the Faculty Advisor under whom the work has been done and is hereby approved.

  
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Faculty Advisor

  
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## PERMISSION

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The author wishes to acknowledge the Lord, who is the wind beneath my wings.

This Scholarly Project is dedicated to my Mother. Growing up I had four younger siblings. I remember my mom telling us of how important it was to turn the baby so that the baby's head would stay well rounded. Shown is a picture of my mother and myself, as a newborn infant. Thanks mom.



I want to thank my husband, Ken for his love, standing behind me and for his words of encouragement. I want to acknowledge my three sons; Michael (Stanford University), Christopher (Bemidji State University) and David (University of North Dakota) and the historical moment in time when all of us were in college together. As always, my sons have taught me the most about the miracle of life, love, development and the joy of motherhood. I'd also like to acknowledge my two wonderful daughters in 'spirit', Crystal and Erica.

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## ABSTRACT

### Parental Education on Positioning to Support Infant Development and Head Shape

Parents that do not provide their babies with a variety of proper body positions throughout everyday activities may increase their infant's risk for motor development problems and abnormal head shaping. The purpose of this scholarly project was to create parental educational materials in order to increase parent awareness and prevention of common problems due to lack of proper infant positioning in everyday activities.

The methodology used was an extensive research literature review, review of current professional resources on this topic, and this therapist's clinical expertise. The clinical products developed from this evidence included: A parental Developmental Care Guide which is a complete informational booklet; an abridged Back to the Basics brochure emphasizing "Tummy Time" in the daily care routine; and a parental educational session on positioning and infant development presented in Microsoft® Powerpoint® format with an accompanying outcome evaluation survey of the educational benefits.

Proper body positioning during an infant's everyday activities can support development, including head symmetry. With the "Back to Sleep Campaign" endorsed by the American Academy of Pediatrics (AAP), it is important to provide a variety of other body positions throughout the day when the baby is awake and engaged in infant occupations such as feeding and playing.

The desired result of this scholarly project is to increase parental awareness of the importance of positioning and its effect on supporting normal infant development and head shaping. The parent educational materials (quick reference/detailed guide, power point presentation, and evaluation) developed through this scholarly project will be provided within the hospital and day care settings to promote the infant motor development and head shaping as related to the infant daily care routine.



## CHAPTER I

### INTRODUCTION

The practice of Occupational Therapy is relevant to the development of the premature infant and to the daily living needs of the century old adult. Occupational performance is common place, unique and potentially cyclical in nature in the life cycle of humans. Assigning meaning to an occupation is as individualized as the individual. The field of Occupational Therapy is about occupation and everyday engagement in tasks that have meaning and purpose (Case-Smith, 2001). Occupation enhances function, just as function enhances occupation. Occupational Therapy's history has been one of change. Its initial identity with the medical model has broadened to the community. Where one does Occupational Therapy and what focus or model one works from is not nearly as important as whom one serves and provides the occupation of "doing" for. Quality, enrichment and engagement in one life's occupation, no matter what stage of life one is in, is the professional task of the Occupational Therapist to support their client in the client-identified jobs of "doing" and to help them reach their fullest capacity and satisfaction.

Whether you are a parent, grandparent, daycare provider, physician or Occupational Therapist, taking care of the "baby" is all of our responsibility. Sudden Infant Death Syndrome (SIDS) is the number one killer of infants in the first year of

life, with the risk of SIDS being at the highest prevalence between 2 and 3 months of age. (American Academy of Pediatrics Task Force on Sudden Infant Death Syndrome, 2005).

The American Academy of Pediatrics (AAP) in 1992 initiated a “Back to Sleep Campaign” to fight against SIDS on behalf of our infants. By positioning the infant wholly on their back for sleep, this campaign attributes a 50% reduction in SIDS.

Over the next decade pediatric Occupational and Physical Therapists and other healthcare providers began to observe a delay in motor patterns and an increase in plagiocephaly (i.e., head flattening of the occiput) (Morrison & Chariker, 2006). The incidence of plagiocephaly began to increase in number as did the infants in our communities wearing a cranial molding orthosis that resembles a football helmet for babies (Boere-Boonekamp & Linden-Kruper 2001; Morrison & Chariker, 2006). The infants that did not receive treatment, whether it be positioning and/or helmet therapy within the optimal time period will wear a misshapen head the rest of their life. Though there may be other reasons for plagiocephaly the majority appear to come about as a result of the “Back to Sleep Campaign”.

The AAP in 1997 continued to support the “Back to Sleep Campaign” but began to reinforce a balance to the system: that being “tummy time” awake and watched. The emphasis on “tummy time” awake and watched was added in order to reinforce symmetrical head molding as well as provide an opportunity for anti-gravity motor skill development. Infants become conditioned to laying on their backs and often times parent report that the infant do not like their “tummy time” (Davis, Moon, Sachs, & Ottolini, 1998).

Occupational Therapy historically utilizes everyday activity as a treatment technique to support the infant's neurological development and the performance skill of movement which ultimately enables engagement in the occupations of sleep, feeding, social interaction and play (Case-Smith, 2001). The infant's autogenic, sociocultural, physical environment, parents and other care providers create a multifactor dynamic interplay of systems on the infant's occupational performance currently and in the future. The effect of this interaction is particularly significant for infants because of the strong relationship between contextual factors and development (Myers, Yuen, & Walker, 2006).

Occupational Therapist's frame of reference is centered around activities of daily living and occupational performance. The Occupational Therapy Practice Framework (AOTA, 2002), was chosen to support this scholarly project development. This comprehensive framework with its focused outcome on performance is compatible with the domain, contextual and client factors needed to provide the infant with the occupations of sleep, play, feeding, and social interaction. When one speaks of the infant, one must speak of a dyad, given the infant's dependence on a parent and or care provider to complete the circle of care. The adults support the infant needs to achieve his/her performance skills and ultimately his/her occupational performance. The comprehensive Occupational Therapy Practice Framework is such that it allows for inclusiveness and analysis of care giving performance components necessary to support the infant. The Occupational Therapy frame of reference takes into account the context in which the activities of daily living are being performed and the influence this may have on the infant's performance (AOTA, 2002).

The Ecological Model of Occupation builds around four constructs: person, context, task, and performance. This makes it a functional framework when looking at the dynamic interplay necessary to provide parental intervention to support the infant in the daily care routine and in infant occupational performance. One of the Ecological Model intervention approaches is prevention, which is an ideal strategy when considering infant development (Dunn, Brown, & Youngstrom, 2003).

Creating a parental education quick reference developmental guide including positioning techniques that can be incorporated in the infant's daily care routine was one goal of this scholarly project. A guide that can be easily referenced will serve as a visual cue and daily reminder of the importance of loving parental interaction, "Back to Sleep Campaign", "tummy time" awake and watched, and the easy and effective way in which positioning can be incorporated into the infant's care routine. The parental educational quick reference guide can also be used to educate and remind other care providers of the infant positioning needs. It is not only important information for the pediatric Occupational Therapist but also the OT working with adult patients that may be parents of young infants and or working in the community with high risk populations. With the high incidence of premature infants (1 in 8 births), (Martin, Hamilton, Sutton, Ventura, Menacker & Kirmeyer, 2006) and their vulnerable susceptibility to environmental and contextual influences, proper positioning in the daily infant care routine is even more vital enabling self regulation, head shape and motor development (Grenier, Bigsby, Vergara, & Lester, 2003). All adults are responsible to take care of the infant in the daily care routine, and to provide loving support to enable the infant to develop to the fullest capacity. It is all of our investment and all of our future...

Healthcare monies can be better utilized in an anticipatory guidance and campaign approach versus on cranial orthotic devices ( e.g., average cost is \$2,000-\$5,000) and rehabilitation therapies in an attempt to rectify a problem that potentially could be eliminated through increased awareness, parental education and positioning of the infant in the daily care routine (Losee & Mason, 2005). Just as the first years are foundational in creating “the child that is the father of the man” (Harris 2001, p. 688), so, is infant positioning practices the impetus of head shaping and motor development that leaves a shape for a lifetime and a potential effect on occupational performance abilities in a temporal foundational fashion.

As an Occupational Therapist working with a team of neonatologists and a dietician in a developmental clinic setting I have witnessed first hand evidence of the motor delay and the incidence of plagiocephaly that was being reported. This became impetus for this scholarly project. A need for better educational prevention strategies to provide parents with ways to incorporate positioning to support infant development and head symmetry in the daily care routine was apparent.

The following chapters in the scholarly project will present a literature review providing studies that have looked at the prevalence of plagiocephaly, motor development, and other environmental influences on the infant’s development post AAP guidelines. Chapter III will include the methodology used in designing the product. Chapter IV includes the presentation of the parental education materials and proposed implementation. The Occupational Therapy Practice Framework (AOTA, 2002) and the Ecological Model of Occupation (Dunn, Brown, & Youngstrom, 2003) will be further discussed in relation to components influencing functional occupational outcomes and

performance. A sample of the proposed quick developmental guide of parental educational materials is included. Finally, in Chapter V, the purpose of the project, limitations of the project, key information and recommendations for implementation of the product are summarized.

## CHAPTER II

### LITERATURE REVIEW

Occupational Therapy and the field of pediatrics are intricately woven together. They provide educational resources and practice techniques to support the infant's development and occupational performance while, at the same time empowering the parents in the role of care provider. Occupational Therapy has a rich historical past as well as a current diversified dynamic present. The American Occupational Therapy Association (AOTA) guides Occupational Therapy practice. The field of Occupational Therapy practice of pediatrics is evidenced-based and is representative of current best practice (Case-Smith, 2001).

The American Academy of Pediatrics guides medical policies that are set forth by their professional organization. The American Academy of Pediatrics (AAP) current guidelines have an influence on parental infant care educational materials as well as trends in the medical and social system sectors caring for infants in the absence of parents. Medical professionals' practices such as pediatric Occupational Therapy help to carry out pediatric practice guidelines set forth by AAP as well as standards set forth by the Occupational Therapy's professional organization, AOTA. Both the AOTA and the AAP are cognizant of the dynamic influential cooperative relationship between the infant-parent dyad and the influence one has on the other in succeeding or not succeeding in carrying over the AAP guidelines and OT practice techniques. This literature review

will look at the parent's infant daily care routine, positioning of the infant while adhering to AAP guidelines, and positioning effects on infant development and head symmetry.

### Attachment and Development

On the basis of theory and observational studies, several investigators have emphasized the role of early infant-mother interactions and the development of attachment. Infant attachment is described as the psychological emotional connection that an infant forms with his or her primary caregiver, usually the mother. This reciprocating interactive relationship is formed through the infant daily care routine. Both the infant and mother respond to the cues of the other. For example the mother responds to the infant's crying cues and the infant gives back cues in response to the mother's efforts. A positive mother-infant attachment is necessary for most favorable growth, development and for a growing parent-infant love relationship (Schenk, Kelley, & Schenk, 2005). The quality of the dyadic interaction between infant and mother secures the attachment. The mother's sensitive responsiveness to the infant will provide the context in which the infant's experiences and feeling of security are organized Main, Kaplan, and Cassidy; Sroufe and Waters (as cited in Wendeland-Carro, Piccinini & Millar, 1999). Mothers of secure infants are more sensitive and responsive toward their infant during feeding, and play compared to mothers of insecurely attached infants Egeland and Farber (as cited in Wendeland-Carro, Piccinini & Millar, 1999). Studies show that maternal sensitivity to the infant is a critical ingredient for the development of secure attachment Bretherton (as cited in Wendeland-Carro, Piccinini & Millar, 1999). The occupations of sleep, social interaction, play, and feeding and the manner in which these occupations are supported brings meaning and purpose to the infant's life, enabling



further occupational acquisition and further growth and development. Activities of daily living and/or infant daily care routines carried out by the parents and/or care providers have an influence on the infant's occupational performance and overall well being (Case-Smith, 2001).

#### Positioning and Motor, Social-Emotional Development

When considering motor development one also should consider the emotional and social environments in which the infant is raised. Emotional and social deprivation have been identified as potential contributors to delays in physical development Dennis (as cited in Bridgewater & Sullivan, 1999). It was reported by Lozoff and Brittenham (as cited in Callahan & Sisler, 1997) more than 15 years ago that infants in America were held less often than were children from developing countries. Increased physical contact, handling and stimulation by the parents have an influence on motor development Cratty and Parizkova (as cited in Bridgewater & Sullivan, 1999). In a study using continuous observation of American infants, on a typical day, infants were held only one-third of the time during their first 3 months of life and only 16% by 9 months of age Lozoff and Brittenham (cited in Callahan & Sisler, 1997). "This pattern of carrying that endured for the first one to three million years has been replaced by one resembling nesting or caching" Lozoff and Brittenham (cited in Callahan & Sisler, 1997, p. 233).

According to a conducted survey with parents, infants spend a significant percentage of their day "nested" or "cached" in seating devices. An observational study of 187 infants younger than 5 months was conducted via administration of a parent questionnaire to determine use of seating devices in infants too young to sit. Ninety-four percent (176 of the 187 infants) spent 30 minutes or longer in seating devices each day.

The mean time spent each day in seating devices was  $5.7 \pm 3.5$  hours and ranged from 0 to 16 hours (Callahan & Sisler, 1997). Infant care equipment designed to carry, position or contain infants is a critical component of the Western parent's infant-care practices (Pierce, 2000). However, extensive use of infant seating devices for infants who are too young to sit unsupported have potential adverse consequences (Callahan & Sisler, 1997). Infant seating devices and the decreased physical human contact with the mother have potential to affect infant development.

### Positioning and Head Shape

Recommendations endorsed by the American Academy of Pediatrics Task Force on Sudden Infant Death Syndrome (2005) to reduce the incidence of Sudden Infant Death Syndrome (SIDS) are to position the infant in a fully supine position (wholly on their back) for sleeping. The definition of Sudden Infant Death Syndrome (SIDS) is “the sudden death of an infant after a thorough case investigation, including performance of a complete autopsy, examination of the death, scene, and review of the clinical history” (Aris, Stevens, Lemura, Lipke, McMullen, Cote-Arsenault & Consenstein, 2006, p.282). The “Back to Sleep Campaign” efforts have decreased the rate of SIDS by 50% since 1992 (Aris, et al., 2006). While the incidence of SIDS has declined in the past decade there has been an increase in positional plagiocephaly without synostosis (PWS). There are no published population-based studies, however, a recent case-control study has shown many cases of PWS are associated with sleeping in the supine position [OR: 2.51 95% confidence interval: 1.25-5.16] (AAP Task Force on Sudden Infant Death Syndrome, 2005). According to the American Academy of Pediatrics Task Force (2005), there has been some debate whether there has been an increase in PWS or simply an increased

awareness. Both an increase and an increased awareness most likely have occurred. The infants that acquire PWS are infants that most likely that did not have the head position varied when put down to sleep, had less than 5 minutes a day of “tummy time” and were less likely to have been held in an upright position when not sleeping (AAP Task Force on Sudden Infant Death Syndrome, 2005).

In a prospective cohort study in the Netherlands 380 term infants were followed at birth and at 7 weeks of age in an attempt to identify risk factors for deformational plagiocephaly within 48 hours of birth and 7 weeks of age. Three determinants were identified with an increase risk of deformational plagiocephaly (DP) at birth: male gender, first born and brachycephaly. Eight factors were associated with an increased risk of DP at 7 weeks of age: male gender, first born, positional preference when sleeping, head to same side on the “chest of drawers”, positioning to the same side during bottle feeding, only bottle feeding, tummy time less than 3 times a day, and slow achievement of motor milestones (vanVlimmeren, van der, Graaf, Boere-Boonekamp, L’Hoir, Helders, & Engelbert, 2007). This study supports that specific care provider routines, as well as motor development, and positional preferences are primarily associated with the development of deformational plagiocephaly.

Another contributing factor to PWS is infants spending excessive times in positioning devices that put pressure against the infant’s occiput. Asymmetrical PWS may develop as a result of positional preference to turn one’s head to one side. Infants below the age of 6 months were screened for positional head preference (n=673) in the Netherlands (Boere-Boonekamp & Linden-Kurper, 2001). Positional preference, defined as when the child’s head is turned toward one side most of the time, may result in

asymmetrical flattening of the occiput. Positional preference in infants has become more prevalent in the Netherlands since the early 1990s and the results of this study showed positional head preference to be observed in 8.2% of the cases and was highest in infants below 4 months of age. Male (i.e., boy: girl ratio 3:2), firstborns, premature children and breech positioning at the time of delivery proved to be higher risk conditions for positional preference. The supine sleeping position and a strong preference in offering the feeding always from the left or the right side were also correlated with positional preference.

#### Positioning, Infant Equipment and Motor Development

Infant positioning has been associated with a child's motor development. A study done in eight day care centers regarding seating device use (n=38 infants) indicated that all infants spend more time in seating devices than on the floor or being held by child care providers. The infants younger than 5 months of age spending the most amount of time in seating devices (Meyers, Yuen, & Walker, 2006). In a related study, it was found that infants that are associated with a high infant equipment usage tend to score lower on infant motor development; infants who have a low infant equipment use tend to score higher on infant motor development (Abbott & Bartlett, 2001). Opportunities exist for health promotion education in child care settings which could improve child motor development. Gupta, Shuman, Taveras, Kulldorf, and Finkelstein (2005) noted that parents of children in child care centers were interested in educational sessions on health topics such as child development.

## Sleep/Play Positions and Motor Development

According to studies reviewed, infants placed in the prone position for sleeping (i.e., not recommended by AAP) acquired motor skills at an earlier age than infants that were placed in the supine position (Davis, Moon, Sachs, & Ottolini, 1998). The results of this study conducted with three hundred fifty one infants concluded that early motor development is affected by sleep position (Davis, et al., 1998). There was a significant difference in the age of skill attainment of rolling prone to supine, sitting (tripod), creeping, crawling and pulling self to stand. Based on clinical observations, prone positioning encourages use of upper body i.e. neck, arms/shoulder girdle musculature, strength needed to acquire many infant motor milestones. There was no significant difference in the age when infants walked. Prone sleepers attained several motor milestones earlier than supine sleepers however, all infants in the study achieved all milestones within the accepted normal age range. Pediatricians can use this information to reassure parents while supporting the “Back to Sleep Campaign” for the prevention of SIDS.

A prospective study of infants that were delivered before, during and after the “Back to Sleep Campaign” in the United Kingdom were assessed to see whether sleeping supine had adverse consequences on motor and mental development (Dewey, Fleming, & Golding 1998). At 6 months of age, infants put to sleep prone had a mean score 0.38 SD (95% confidence interval [CI]: 0.28, 0.49) higher on the gross motor scale; 0.11 SD (95% CI: 0.00, 0.23) higher in social skills; and a total development score 0.20 SD (95% CI: 0.10, 0.30) higher than those sleeping supine. In this study, there was some evidence that putting infants to sleep in the supine position resulted in lower developmental scores

at 6 months of age. The infants were developmentally assessed at 6 month of age and again at 18 months. Putting the infant to sleep in supine position resulted in a reduced developmental score at 6 months but this difference appeared to be transient and there was no developmental difference apparent at 18 months of age.

Rate of infant motor development seems to be influenced by extrinsic factors such as positioning practices. Since the “Back to Sleep Campaign” it has been suggested that the change in sleep positioning from prone to supine has influenced awake positioning practices (Majnemer & Barr 2006). Infants come to prefer the supine versus the prone position when awake, hence parents’ may tend to avoid positioning the infant prone during the infant care routine. Lack of exposure to the prone position or “tummy time” provides the infant with limited opportunities to learn and practice motor skills that require anti-gravity extensor movements ( i.e. rolling from their stomach (prone) to their back).

A pilot study of 66 infants between the ages of two months and 6 months old adds to the relationship between infant sleep and play positions and the differences in motor development compared with previously established normative motor milestones. Two month old infants who spent greater than 15 minutes of awake-time in prone statistically had similar pass-fail distributions to the normative population on items sensitive to anti-gravity extensor muscle control. This study suggested that not only sleep but also awake time in prone may relate to achievement of developmental gross motor milestone (Salls, Silverman, & Gatty, 2002). In a Dutch study sleeping and playing in the prone position resulted in more advanced motor development in healthy 5 month old infants (Boere-Boonekamp & Linden-Kurper, 2001).

A study of 4 and 6 month old infants was conducted to compare motor performance among infants sleeping prone versus the supine position. Motor delays were documented in 22% of babies sleeping supine. Prone sleep-positioned infants were more likely to roll and sit. Results indicated that daily exposure to awake prone positioning was predictive of motor performance in infants sleeping supine (Majnemer & Barr, 2006). Infants were reevaluated at 15 months of age. Overall development was similar between the supine and prone groups, though subtle differences on particular milestones and the score distribution were noted associating motor performance to sleep position.

Thirty-six month old infants who slept supine were evaluated using the Alberta Infant Motor Scale (AIMS) and then divided into two groups: prone (n=16) and no prone (n=14) based on the number of times per day they were placed in prone positioning when awake. The prone group scored higher than the no prone group on the AIMS total score (U=36, p=0.004), total percentile score (U=42, p=0.003), and prone subscale scores (U=25, p<0.001). As measured by the AIMS, gross motor performance was more advanced in the infants who slept supine and were placed in prone position when awake than the infants who slept in supine but had limited or no experience in prone position when awake (Monson, Deitz, & Kartin, 2003).

A study of 343 full-term infants sleeping in the supine position resulted in changes in motor development at their 4 month old well-child physician check up. The results of the study indicated that infants that slept on their side or supine were less likely to roll over at the 4-month exam than infants who slept primarily in the prone position (p<.001). Other milestones screened did not show significant changes (Jantz, Blosser, & Fruechting, 1997).

The studies above provide evidence supporting the relationship between both the sleep and awake positioning practices and infant motor development. Findings raise the question whether parents may be misinterpreting the “Back to Sleep Campaign” and as a result are avoiding the prone ( i.e., “tummy time”) position for their babies during both sleep and when awake. In 1996 and in 2000 a certain amount of “tummy time” while the infant was awake and watched was recommended by AAP for developmental reasons and to help prevent flat spots on the occiput (AAP Task Force on Sudden Infant Death Syndrome, 2005; Salls et al., 2002).

#### Positioning and Emergence of Motor Milestones

Infant motor development is generally assumed to follow a consistent sequence but cultural and environmental influences are to be recognized (Ratliff-Schaub et al., 2001). Motor development has historically been used by healthcare providers, care providers, and parents as an indicator of neurological maturation during infancy (Bartlett & Fanning, 2003). Health professionals need to be aware of how positioning does affect early motor development. Information regarding infants’ sleep and play positions may be important to the Occupational Therapist when evaluating motor development (Salls et al., 2002). Parents need to be reassured that milestones may emerge later than expected if their infant is not given prone positioning (i.e., “tummy time”) while awake and watched. Ultimately, it may be necessary to establish new normative data for infant motor assessments to help identify children in need of rehabilitation intervention (Majnemer & Barr, 2006).



## Summary

AAP guidelines in the “Back to Sleep Campaign” will keep an infant at less risk for SIDS while “tummy time” awake and watched will enhance motor skill development, including helping to promote infant head rounding and symmetry. Anticipatory guidance regarding AAP policy guidelines (i.e., “Back to Sleep Campaign” for SIDS prevention and “tummy time” awake and watched to promote motor development and head shaping) will help to eliminate two problems commonly seen in infants during the last decade. As reported by AAP, there has been a significant statistical decline in SIDS due to the back to sleep positioning (AAP Task force on sudden infant death syndrome, 2005). The “Back to Sleep Campaign” advocating for infants to be positioned on their back while sleeping has been embraced by the majority of parents on behalf of their infants. “Tummy time awake and watched” must become the next mantra in an attempt to maintain appropriate head rounding and symmetry and to promote motor development. Just as the first year is foundational in creating the child that is to become the father of the man, so is infant positioning practices the impetus of head shaping and motor development that leaves a shape for a lifetime and a potential effect on occupational performance abilities in a temporal foundational fashion.

The infant first year truly is foundational to a lifetime of potentially 20, 50, 75, or perhaps a century of occupational performance. Foundational skills must be strong. As a mason would lay a brick side by side, alternating the pattern layed in each row to promote strength and symmetry, we too, must gently lay our infants in the daily care routine by alternating the positions in which their care is provided shaping foundational

experiences that will enable them to be strong, safe, symmetrical and well balanced for a lifetime.

This literature review has supported the premise that positioning does have an influence on motor development and head symmetry in the daily care routine. In the following chapters you will find the methodology used to design the product (Chapter III), presentation of the parental/care provider education materials (Chapter IV), as well as a summary chapter (Chapter V), of the purpose, limitations, key information and recommendations for implementation of the product.

## CHAPTER III

### METHODOLOGY

The methodology used was an extensive research literature review from multiple health professional sources. This author, a Pediatric Occupational Therapist, has observed relevant developmental issues in everyday practice in the hospital and clinic settings such as delay in infant motor milestone acquisition as well as a difference in the sequential manner of gross motor development that one would expect if guided by a neuromaturation theory (Case-Smith 2001). Clinically, the increase in symmetrical and asymmetrical plagiocephaly has also been noted. This apparent need for more parent education prior to discharge from the hospital sparked the desire to create these parent education materials. A simplified quick reference parent education guide that could be readily reviewed prior to discharge from the hospital and that was in a parent friendly stand apart format from other literature was the goal of this project. An ideal goal was to add a personalized touch to the product to spark ownership by the parent and a further connection of the importance of these parental guidelines in supporting their infant's development and ensuring a nicely shaped head. This type of parent educational material seemed like a practical and novel attempt to help decrease common problems such as plagiocephaly and delayed motor skills post discharge. There are plenty of brochures on the market about development, the "Back to Sleep Campaign" and "Tummy Time" but the information is overwhelming to the parents and is often not followed. Given the common problems that this therapist has seen in infant practice seemed that focusing on

positioning and the everyday care routine was a new approach or at least a new focus for parent and care providers educational materials. The American Academy of Pediatric (AAP) current task force information (2005) was a core document in which the parental educational materials were build around. The “Back to Sleep Campaign” was reinforced as it is one of the guidelines for the prevevention of Sudden Infant Death Syndrome. However, delays in attainment of gross motor skills could be observed in infants who slept supine. Another less known or acknowledged guideline by the AAP is supervised play time in the prone position. It was also observed that infants that were given the opportunity to spend “tummy time” awake and watched several times a day had less delay than those that were not given the opportunity by their parents and/or care providers. An increase in plagiocephaly without synotosis was also noted to be on an increase. Increased infant equipment devices also plays a factor in gross motor delay and plagiocephaly. Keeping the AAP task force guidelines in the center of the scholarly project, this therapist began to explore what other healthcare colleagues had experienced.

Healthcare research articles from an array of disciplines readily supported the concerns that indeed were as common place as seen in this Occupational Therapist practice. For example infants that have high equipment use tend to score lower on infant motor development that infant’s that have a lower equipment use (Abbott & Bartlett, 2001). A study looking at the relationship of equipment use and play positions to motor development of 8 month-olds suggested that infants who were engaged in more active play positions such as “tummy time” had higher scores on the Alberta Infant Motor Scale than infants that were placed in sitting or supine positions (Bartlett & Fanning, 2003). Another study put out in the Occupational Therapy literature indicated that the infants in

eight child care centers spent more time in infant seating devices than in caregiver's arms or on the floor (Myers, Yuen & Walker, 2006). Extensive use of infant seating devices with infants who are too young to sit unsupported had several adverse consequences. Infant development can potentially be affected due to decrease infant/mother physical contact time and medical complications such as reflux episodes and apnea (Callahan & Sisler, 1997). The American Academy of Pediatrics (AAP) cautioned about avoiding letting infants spend excessive time in bouncers and car seat carriers so to decrease pressure into the infant's back of the head (AAP task Force on SIDS, 2005).

As in the United States there too was an increase in positional deformational plagiocephaly referrals in the Netherlands after the "Back to Sleep Campaign". As part of a prevention approach parents were instructed in handling and positioning techniques in regard to everyday infant care activities (Boere-Bonnekamp & Linden-Kuper, 2001). Another AAP Pediatric research journal article noted that increased risk of deformational plagiocephaly was primarily caused by postnatal, external factors (positioning and care) and inversely associated with achievement of motor milestones (van Vlimmeren, van der Graaf, Boere-Boonekamp, L'Hoir, Helders & Engelbert, 2007). The rate of infant motor development appears to be influenced by extrinsic factors such as positioning practices.

A study looked at the relationship between infant sleep position and motor development in the preterm infant. Infants sleeping supine were less able to lift their head and lower with control than infants that slept in the prone position, but global developmental status was unaffected (Ratliff-Schaub, Hunt, Crowell, Golub, Smok-Pearsall, Palmer et al., 2001). In a research article in the AAP Pediatrics Journal sleep position associated with less time in prone while awake and watched had an effect on

motor skill acquisition (Majnemer & Barr, 2006). A research study conducted by Jantz, Blosser and Freuchting (1997) concluded that sleep position significantly influenced the age of achieving the gross motor development of rolling over. Infants who sleep in the side or supine position roll over later than infants who sleep in the prone position. A research study conducted by Davis, Moon, Sack and Ottoloni (1998) noted that prone sleepers attained several milestones earlier than supine sleepers, however, all the babies achieved all milestones within the accepted normal age range. Another article by Dewey, Fleming, and Golding (1998) found that developmental differences were noted in infants that slept in a supine position versus prone position however, it was felt that these differences were transient and that by 18 months of age in the two groups no differences existed. An article published in the Pediatric Physical Therapy Journal looked at the relationship between awake positioning and motor performance since the recommended change of sleep position (supine). Infants that had no prone awake positioning scored lower than infants that had prone play opportunities (Monson, Deitz & Kartin, 2003). They found delays or lower performance on certain motor skills relative to published norms in early infancy in both preterm and term infants. The delays in attainment of some motor skills seemed to be transient and infants had typical development later in the first year of life. This study questioned if the quality of movement is influenced by delays in certain motor skills due to lack of experience in early infancy. Salls, Silverman and Gatty (2002) looked at sleep and play positions and its effect on gross motor development. Findings suggested that not only sleep position, but time spent in the prone position when awake and watched may have an effect on developmental milestone achievement in infants. This study added to the growing data that described a

relationship between sleep and play positioning and the differences in motor development compared to motor norms found prior to the back or side-lying sleep campaign and prone positioning awake and watched. The AAP (1996, 2000) also concurs with recommended prone play for developmental enhancement as well as to prevent flat spots on the infant's occiput. A study published in the *Australian Journal of Physiotherapy* found significantly positive correlation between wakeful positions/activities and motor development. Infants who spent more time in stimulating circumstances such as bathing, and exercising had higher scores on the Motor Assessment of Infants (Bridgewater & Sullivan, 1999).

The importance of parental educational materials to increase awareness of the impact of maternally sensitive responsiveness in forming secure attachments (Wendland-Carro, Piccinini & Millar, 1999) is crucial to the welfare of the infant. The quality of care giving albeit mother and father, can contribute to the emotional security and connectedness of the triad relationship. Reading the infant's cues and lovingly responding to their needs is critical. Setting up the home environment to support the infant's developmental needs is important and supports the concept of context and co-occupation (Pierce, 2000). Modeling appropriate infant care routine in the hospital and providing parent education prior to discharge is important to the health and development of the infant (Aris, Stevens, LeMura, Lipke, & McMullen, 2006). Medical clinic follow-up appointments for the infant and the parental education materials given at hospital discharge provides another opportunity for healthcare providers to reinforce and review the importance of positioning the infant in the daily care routine. This becomes an effort to support motor development and head symmetry while at the same time ensuring the safety of the infant by reinforcing the "Back to Sleep Campaign" and AAP guidelines.

Since many infants spend a great deal of time in child care centers, health promotional education for care providers is appropriate and another venue to promote consistency of care and further reinforce educational opportunities for the families. Senator Hiliary Clinton's book title based on the African proverb "It takes a village" speaks to the care necessary we need to provide for our infants, our most precious resource and all of our futures...

### Summary

The literature review supported the content of the educational materials that were created for parents and caregivers, while supporting the AAP guidelines for infant safe sleep practices and supervised "tummy time". Four primary components of the care provider educational materials were created with varying lengths of content and venues in which the materials can be presented. The core basic focus points of the infant care routine education is presented in the "Back to the Basics," quick reference guide for parents. The longer version of the educational pamphlet provides further detail regarding the basic core points as related to the infant care routine and some basic rationale as to why you position the infant in the care routine; hence, to further support development and head symmetry. A Microsoft® Power Point® was created as an alternative way to present the educational materials to groups of people whether that be new parents in a hospital setting and/or in a community day care facility. The Power Point® presentation and the longer educational pamphlet could also be used to orient new hospital employee obstetrical nurses, pediatric clinic nurses, pediatric therapists and/or student nurses. The follow up post outcome survey is a reminder of core concepts and a measure of whether the information presented was understood and if in actuality the participants had modified



the infant's daily care routine to support motor development and head symmetry. The survey results also provides insight into practical ways in which the educational presentation can be changed and presented in a more effective manner to meet the needs of the audience. Oftentimes in the suggestions and or comments sections in the survey other concerns about the welfare regarding developmental care of the infant and/or other topics may be suggested for future presentation at a later date.

Having a variety of venue formats in which to present the educational materials allows one to speak most effectively to the situation at hand. It also allows one to grade the educational materials to meet the needs of to whom the materials are being presented (i.e., simple to complex). Knowing that our world moves at a fast pace and that there is much written materials available to parents I wanted a quick reference guide that would be practical, to the point, and practiced in every day care activities of the infant and served as a visual cue reminder. The parent and/or professional that has a need to know more the details, the why's and the rationale are afforded the longer educational format. The Microsoft® Power Point® is an efficient way in which to meet the educational needs of groups, while offering a professional and personal touch by the presenter to adapt the content depending on the need of the audience. Ultimately whichever educational version is used, the hope is to transform the word format into and action caring activity of supporting infant motor development and head symmetry in the infant daily care routine.

## CHAPTER IV

### PRODUCT

In 1992 the American Academy of Pediatrics (AAP) endorsed the “Back to Sleep Campaign” for infants in an effort to reduce sudden infant death syndrome (SIDS). This practice guideline had an effect on the incidence of SIDS reducing it by 50% however, other infant complications arose as a result of the “Back to Sleep Campaign” (American Academy of Pediatrics Task Force on Sudden Infant Death Syndrome, 2005). The two primary issues of concern are a delay in motor skill acquisition and an even more concerning issue is the rise in the number of infants that have developed plagiocephaly (i.e., flattened heads). The “Back to Sleep Campaign” seemed to be successful in getting the message out regarding safe sleep position but the AAP had also endorsed the importance of providing infants with supervised opportunities to play on their tummy when awake (AAP Task Force on Sudden Infant Death Syndrome, 2005). The second half of the endorsement (i.e., supervised “tummy time” play) has not regularly been followed by many parents/care providers, thus creating a group of infants that characteristically had a delay in motor skills and/or flattened heads due to prolonged positioning on their backs. In the American Academy of Pediatrics’ Policy statement published in November, 2005, it was reported that over the past decade there has been a dramatic increase in the incidence of plagiocephaly. Although, there have been no published population-based studies, a recent case-control study has shown that many cases of plagiocephaly are associated with supine sleeping position (OR: 2.51; 95%

confidence interval 1.23-5.26) (American Academy of Pediatrics Task Force on Sudden Infant Death Syndrome, 2005). Such infants are more likely not to have the head position varied when put down to sleep, more likely to have had less than 5 minutes per day of "tummy time", and less likely to have been held in an upright position when not sleeping. A study put out by the University of Louisville School of Medicine stated that on an average they evaluated 210 children per year in their tertiary referral service and referred an average of 48% for cranial molding therapy. While estimation of the incidence of positional plagiocephaly varied 1 in 300 live births before the "Back to Sleep Campaign", currently the rate is estimated to be 1 of 68 and 1 of 72 live births after the AAP recommendations (Morrison & Chariker, 2006). The problem area that this project addresses is how to get the word out regarding the AAP recommended importance of "tummy time" to promote motor development as well as keeping the head rounded (AAP Task Force on Sudden Infant Death Syndrome, 2005). "Infant Positioning and Its Effect on Development and Head Symmetry" is this project's title.

The key project components to "Infant Positioning and Its Effect on Development and Head Symmetry" are:

1. Education (via Microsoft® Power Point®) – One session provided by a Pediatric Occupational Therapist entitled "Back to the Basics".
2. Demonstration (using a doll) and or live infant.
3. Consultation-"Ask a Pediatric Occupational Therapist."
4. "Back to the Basics" Brochure-emphasizing "tummy time" opportunities in the daily care routine.

One intended result of “Infant Positioning and Its Effect on Development and Head Symmetry ” is to ensure that no baby unnecessarily wears a physician prescribed customized cranial molding helmet on their head in an attempt to reshape the head. The prescribed helmet must be worn for 23 out of 24 hours a day, potentially for up to 4-5 months (Losee & Mason, 2005). Cranial molding helmet therapy is time intensive for the prosthetist and many adjustments may be required over the course of treatment. The price of the cranial molding helmets can range from \$2,000 to \$5000 for a complete course (Losee & Mason, 2005). The majority of plagiocephaly (head flattening) is preventable. Placing the supervised infant in a “tummy time” play position, alternating head position as related to daily activities, and avoiding prolonged containment in seating devices (which provide pressure against the skull) are three simple preventable measures that the parents/care providers can do to help decrease or eliminate the problem. The intended result is to prevent a child from having an abnormal head shape the rest of their life.

The second intended result of this identified project "Infant Positioning and Its Effect on Head Symmetry" is to provide the infant opportunities for “tummy time” play to strengthen and develop their muscles and to promote motor development emergence in a timely manner (Salls, Silverman, & Gatty, 2002). America is on the move and uses multiple baby seating devices in the daily care routine. Too often, infants are moved from one “container” to another, not allowing for proper muscles to be exercised to support motor development. Another complicating factor of these modern day baby devices is the hard surface they often provide against a delicately developing head. The hard surface provides too much pressure against a soft maturing skull.

The intended audiences for this product are parents of newborn infants in a hospital setting (i.e., Level I, II, and III nurseries) and licensed daycare providers. Initial introduction of the product would take place in the hospital setting and later in a community setting in licensed day care facilities. Adult learning principles were incorporated (i.e., one on one and or group demonstration/with return demonstration when appropriate) lending itself to an affective, social, cognitive, behavioral and psychomotor experience. Verbal review/positive reinforcement of the educational materials lends it self to cognitive/behavioral learning. Visual personalized pictures would be an example of an affective, social and behavioral learning experience.

#### Level I, II, and III Newborn Nurseries

Parents will be provided with a “Back to the Basics” educational brochure in the hospital newborn nursery setting. The parent educational brochure can be used to reinforce the infant care routine instructions that were demonstrated to the parent in the hospital in an attempt to ensure carry over from the hospital nursery routine to home. Parent education materials also enable significant others to understand what it is that the parent is to engage in as part of their parenting role to support their infant. Parent educational materials may also be helpful in communicating to other professional care providers (i.e., physicians, home or public health professionals and early intervention school staff post-hospitalization) to enable continuity and reinforcement of daily care routine strategies while increasing awareness of AAP guidelines.

Given the short length of stays in the hospital, significant others may not be present during an infant educational care routine session to allow for hands on demonstration, return demonstration and learning. Having a visual/written parent

education brochure available to bring home allows for repetitive review leading to learning and carry over. A barrage of human emotion goes with the birth of an infant, perhaps making new learning somewhat overwhelming. Having educational materials available to refer to at a later time will be helpful and more easily absorbed as parent and infant settle into routine activities of daily living.

Incorporating individualized teaching into the daily care routine when possible is an effective method of teaching (i.e., infant bathing, bottling). If the infant is too medically fragile and/or timing of infant cares is not coinciding with parent availability, simulation using a doll may be substituted and used to demonstrate positioning techniques. Incorporating question and answer time into the teaching/learning opportunities is another effective way to teach and gives insight into the parents understanding of the educational materials. An educational brochure will be provided consisting of pictures of infant daily care routine examples as visual reminders and reference points for the parents. Small group teaching using the Microsoft® Power Point® educational presentation and simulation could also be a teaching technique that could be considered within a hospital setting. In an acute hospital setting one on one parent infant dyad or triad often times is the most practical way of teaching for this population. Just as each infant is unique, so too, is each family system.

Community educational opportunities in licensed day care settings is another venue in which to reach care providers of infants as well as their parents. Two-thirds of U.S. infants younger than 12 months are in nonparental child care (AAP Task Force on Sudden Infant Death Syndrome, 2005). Of that two-thirds population, 40% are cared for by licensed child care centers or family child care homes. Infants of employed mothers

spend an average of 22 hours a week in child care. Infants of mothers that work full-time, spend 35 hours or more each week in nonparental child care (AAP Task Force on Sudden Infant Death Syndrome, 2005).

Preventative information on the importance of positioning and its effects on development and head symmetry will be provided to parents and daycare providers via a Microsoft® Power Point® presentation, positioning demonstrations using a doll and/or live infant demonstration, and a “Back to the Basic” brochure emphasizing “tummy time” opportunities as related to the daily care routine. A poster of the educational class will be posted in the community licensed day care facilities and/or information sent home in form of a newsletter inviting parents and care providers to attend. If the daycare facility is open to the general public invitation, perhaps as a promotion for their daycare, an announcement could be made in the local newspaper under current community events. The educational session will be provided by an Occupational Therapist at a variety of licensed community daycare facilities settings. Immediately following the class, there will be an opportunity to consult with the pediatric Occupational Therapist regarding specific questions concerning their infants. Names of physicians specializing in craniofacial assessment as well as other community resources will be provided upon individual parent request. Extra “Back to the Basics” brochures will be left at each licensed daycare facility, so that when new infants enter into the child care centers, information on positioning and its effect on head symmetry and development education can be provided to the parents.

A follow up written survey one month post hospitalization and one month post educational session presentations will be sent to parents/care providers to assess if the

daily care routines to support infant development and head symmetry are being implemented and/or have changed as a result of the educational information. Success for this project will be defined as: only one baby is prevented from having a flattened head and experiencing delayed developmental motor skills. However, the likelihood of impacting many infants' lives is great. Many infants are sent to daycare at a young age (i.e., 6 weeks). Knowledgeable newly trained consistent care providers will help to prevent delayed development and decreased head symmetry through positioning the infant properly in the daily care routine now and with future infants that will be entrusted to their care. Day care providers can continue to educate parents regarding the importance of positioning to ensure that the infant's head stays rounded and symmetrical as well as support timely infant motor skill development.

The plan is to recruit voluntary manpower sources from college students in early childhood and/or Occupational Therapy and Physical Therapy programs. Students can assist in giving the educational presentation while at the same time participating in learning experiences. Active engagement of our future early childhood educators and Occupational Therapy and Physical Therapy interns will help to ensure the future of the next generation of infants by providing this learning opportunity early in their careers. Babies are a vulnerable group and I want to give them a voice that says “positioning does have an effect on my development and head symmetry; please take good care of me, for the first months last forever.”

#### Parent Education Brochure (“Back to the Basics”) Description

A parent/care provider’s educational brochure has been developed as a quick reference guide and a visual reminder of positioning techniques that can be incorporated



into the daily infant care routine. The importance of the positioning techniques is to support the AAP guidelines: “Back to Sleep Campaign” and “tummy time” awake and watched while at the same time being aware of the influence that the infant care routine can have on shaping the infant’s head.

This quick reference guide is meant to be just that. Too often parents are given a myriad of written materials on the day of discharge from the hospital. This is often times overwhelming to the parents and frequently the materials are not referred to or utilized in the daily routine. The quick reference was developed as part of this scholarly project. The intent was to take the practical approach and simplify the materials so that they could easily be picked up again and again as a parent “friendly reminder”. The quick reference guide explains ways that positioning techniques can be incorporated into the infant’s daily care routine while ensuring safety of the infant and supporting infant development and head symmetry (American Academy of Pediatrics Task Force on Sudden Infant Death Syndrome, 2005).

#### Occupational Practice Framework/Parent Education Materials

The process described in the AOTA’s Occupational Therapy Practice Framework: Domain and Process is comprehensive and holistic in nature looking not only at occupational performance, performance skills, patterns, client factors, activity demands but also contextual relations and their influence on performance (American Occupational Therapy Association, 2002). This scholarly project’s process delivery model centers on the infant’s/care provider’s needs to support the infant’s engagement in age appropriate tasks and occupational performance in relation to the infant’s daily care routine. Many factors influence infant performance. Performance skills such as motor skill development

is critical to help support the infant develop anti-gravity movements. Performance patterns of the parent/care provider to routinely place the infant on their back to sleep and prone on the floor for “tummy time” is critical in supporting the infant in their role of developing and the parent/care provider in their role as guardians of the infant. Contextual factor such as physical, social, cultural, personal, spiritual, temporal and virtual aspects are interrelated conditions surrounding the infant/parent that influence performance. For example, the infant is brought to a daycare by the parent and the current infant care practice only allows for the infant to be placed in seating devices and/or crib. Floor playtime is being limited and/or eliminated due to a respiratory illness outbreak among the infants and lack of staff time needed to properly disinfect the mats between infant groups. Activity demands of caring for the infant in the daily care routine, the variety of positions, and equipment devices needed to properly care for the infant must be understood by the parent and/or care provider to ensure safety recommendations and to support development and head symmetry. The infant’s own intrinsic system is a client factor to be considered. For example the neuromaturational and sensorimotor system of the infant will have an effect on performance (Case-Smith, 2003). Other client factors that need to be considered in this dyad infant/parent relationship is the parental/care provider’s cognitive abilities and affective availability to the infant. Contextual factors, activity demand and client factors have an influence on performance skills and patterns. Performance skills and patterns in turn have an effect on occupational performance, hence daily living and quality of life afforded to the infant.

## Ecological Model of Occupation

The Ecological Model of Occupation is another model that will be utilized to support the infant/parent dyad and the daily care routine. The Ecological Model of Occupation Framework is built around four constructs (i.e., person, context, task and performance) (Dunn, Brown, & Youngstrom, 2003). Although the Ecological Model of Occupation takes all constructs into consideration as being important, the model tends to highlight context. A main purpose of the ecology of human performance was to provide a framework that emphasized the essential role of context and its influence on task performance. This model takes into account the importance of person and context factors for each particular task performance. The Ecology of Human Performance includes intervention approaches (i.e., establish/restore, adapt/modify, alter, prevent and create). The Ecology of Human Performance Model of intervention approaches leaves more room for prevention or for creating and supporting intervention strategies that support optimal performance while not assuming a disability exists or is likely to occur. Its structure provides opportunities to address person variables (i.e., sensorimotor, cognitive, psychosocial), context variables (i.e., physical, social, culture, environments), task variables (i.e., analysis of meaningful developmental appropriate activity), and occupational performance (i.e., eating, play, social, health maintenance). The contextual factor, in general, seems to have a huge factor on influencing the infant's performance (i.e., social, environmental, cultural and physical). The infant that is seen may have the inherent ability to perform a task/occupation but the context variables may provide barriers to performance. The influence of the infant's physical environment and/or social/cultural environment may not offer him the support or opportunities needed. For

example, the infant may have the ability to learn to have arms extended in prone but, because the family has several dogs and the home is not clean, the infant is not given an opportunity to be put on the floor for their “tummy time”. Rather the infant may be seated in an infant equipment device that tends to promote a total body extension posture as the child tries to counteract gravity and reach with their feet for stability. The infant then may develop increased extensor type patterns due to spending many hours in an infant seating device. When this infant’s motor performance is assessed, it is more difficult for the Occupational Therapist to discern whether the infant has increased extensor muscle tone in his lower extremities as related to a neurological central nervous system disorder or as related to environmental influence or partly both. The Ecologic Model of Occupation also provides a framework that can encompass other disciplines i.e., public health, early intervention and medical that may be involved in the infant’s life.

Both the AOTA’s Occupational Therapy Practice Framework (2002) and the Ecological Model of Occupation (Dunn, Brown, & Youngstrom, 2003) were used to inform this scholarly project development. The Occupational Therapy Practice Framework provided a client focused framework that enabled occupation to be a means and an end. The ultimate goal for the infant supported by the parents/care provider is to engage the infant optimally in the occupations of sleep, play, social engagement and motor development. The Occupational Therapy Practice Framework provided an outline of the various factors that need to be considered when looking at the intervention process components of these occupations (i.e., performance skill/patterns, context, activity demands, and client factors). The Ecological Model of Occupation is a framework that considers the factors of person, task, and context and how the relationship among these

factors has an influence on performance, hence infant occupation. Given that the infant occupations are dependent on the parent/care giver the process components of the Occupational Therapy Practice Framework and the Ecological Model of Occupation could also be utilized to assess parent/caregivers function and how this relationship affects the infant's occupational performance. These frameworks allow for a systematic look at process components that make up and have an influence on the quality of functioning in occupational performance.

### Summary

In the following pages, the “Back to the Basics” (parent education materials), scholarly project will be presented. First, two educational brochures are included. One is a condensed version for the purpose of allowing parents/care providers to have a quick reference guide available to them to refer to as needed on a day to day; the second is an expanded version so that more materials are available to further understand the process as to the importance of daily infant positioning techniques and the effects that it can have on development and head symmetry. Both educational brochures will be provided to the parents and healthcare professionals in the hospital setting as well and will be available to parents/care providers in the community setting (i.e., licensed day care facilities).

Secondly, an outline with session objectives of the Microsoft® Power Point® educational presentation is included. This presentation will be provided to health care providers, licensed day care providers, parents and other significant care providers by the Occupational Therapist both in the hospital and in the licensed day care settings. Lastly, an outcome measurement tool is provided, where by the educational session attendees

can indicate their learning. The educational program outcomes can be tracked, including knowledge of contact areas to improve or change.

BACK TO THE BASICS

Infant 0-5 Months

DEVELOPMENTAL CARE GUIDE

Marjorie Dvorak, OTR/L

May 10, 2008

**Back to the Basics**  
**Infant 0-5 Months**  
**Developmental Care Guide**  
**Marjorie Dvorak, OTR/L**

1. **Tummy Time** “Awake and Watched”
  - on the floor.
  - at least 3 times a day-increase time.
  - music and visual stimulation;  
toys, safety mirror.
  - massage infant’s back.
  - parent lies on the floor on their  
stomach face to face with infant.
  - place infant on their tummy on the  
parent’s chest/parent’s shoulder.
2. **Side-lying** “Awake and Watched”
  - on the floor; head in midline.
  - hands near mouth-sucking.
  - visual stimulation i.e. humans, toys.
3. **Feeding**
  - breastfeeding; alternate sides.
  - bottlefeeding; alternate arms’.
  - enjoy looking at each other.
4. **Diapering**
  - place head at different ends of  
changing table.
  - roll your baby from side to side as  
fastening the taps on the diaper.
5. **Dressing**
  - turn dressing opportunity into  
exercise time.
6. **Bathing**
  - towel dry baby while on their belly.
  - massage infant from head to toe.  
after diapering and bathing.
7. **Carrying**
  - parent alternates arms/direction.  
that infant is carried in.
8. **Baby Equipment**
  - limit time baby spends in them.
  - parent’s arms are best.
9. **Head Positioning**
  - check for balance and roundness of  
head from the top down  
(i.e., crown) weekly.
  - position activity at midline and/  
or on each side alternating/balance.

10. **Bonding**
  - each interaction of the daily care routine.  
creates an attachment that last a lifetime.
11. **Back To Sleep**
  - place infant on back to sleep.
  - alter head positioning during sleep.
  - lay infant at opposite ends of crib weekly.

**BABIES LOVE TO BE LOVED**





## **Positioning and its Effect on Development and Head Symmetry**

Parents provide their babies with a variety of proper body positions throughout everyday activities supporting their infant's motor development and head shaping. If not provided with a variety of proper body positions throughout the daily care routine, infants may increase their risk for motor problems and abnormal head shaping (Miller & Clairen, 2000). With the "Back to Sleep Campaign" endorsed by the American Academy of Pediatrics (AAP), it is important to provide a variety of other body positions throughout the day when the baby is awake and engaged in infant's occupations such as feeding, play, and social interaction (American Academy of Pediatrics Task Force on Sudden Infant Death Syndrome, 2005). The purpose of these educational materials is to increase parent awareness of and prevention of common problems due to lack of proper infant positioning in everyday activities of daily living.

## **Positioning to Support Infant Development and Head Symmetry**

### **"Back to Sleep Campaign" Positioning**

The "Back To Sleep Campaign" was endorsed by the American Academy of Pediatrics to decrease the incidence of Sudden Infant Death Syndrome (SIDS) (AAP Task Force on Sudden Infant Death Syndrome, 2005). Position the infant wholly on his back for sleep. On a weekly basis, position your infant at the opposite ends of the crib on their back to stimulate different types of head positioning and infant's potential visual response to objects around them. When sleeping if the infants prefers to have a turning of the head to the same side, move or change the infants head position when sleeping. When the infant is awake, position the infant in his environment facing toward the action where daily living activities can have an influence on the infants' head position.

Example: turn head toward the action, or keep face at midline or facing straight ahead.

### **“Tummy Time” Positioning “Awake and Watched”**

The American Academy of Pediatrics endorsed supervised “tummy time” opportunities for infants to promote motor development and prevent flat spots on the infant’s head. (AAP Task Force on Sudden Infant Death Syndrome, 2005). Here are the positioning recommendations for “tummy time”.

- Providing your infant with an opportunity to play on the floor a minimum of 3 times a day. Increase the length of playtime as tolerated as evidenced by the infant cues.
- Infants’ enjoy their parents’ company and looking into the eyes of their parents down on the floor eye to eye with them is motivating and provides for a special parent infant bonding time.
- Toys, safety mirror and music may also be used to motivate the infant in the “tummy time” position.
- Being held upright by the parent’s shoulder helps to relieve pressure from the back of the infant’s head and provides the infant with opportunities to practice anti-gravity movements patterns and strengthen neck muscles. By alternating the infant on the parent’s left or right shoulder the parent’s provides the infant with the opportunity to use a full range of neck muscles in both directions.
- “Tummy Time” position on mom or dad’s chest provide a nice opportunity for face to face interaction, bonding time as well as an opportunity to strengthen neck and shoulder girdle musculature in this anti-gravity position.

### **Side-lying Positioning “Awake and Watched” by the Parent**

Playing on the floor provides a fun and therapeutic play surface for the infant to exercise his/her muscles and begin to build body awareness. The infant is given pressure touch into the hip and shoulder joints that are contacting the floor surface as well as head and hands are positioned in midline, making infant’s hands more accessible to the infant’s mouth. Alternating side-lying positions from infant’s left to right side is important.

### **Feeding Positions**

Breast feeding provides a natural opportunity to change the infant’s feeding position as the mother provides milk from each breast for her infant. When the infant is bottled it is important for the care provider to alternate arms in which the infant is held during feeding. This alternating provides the infant with the opportunity to turn their head to the right and to the left sides. Position infant in such a manner that pressure from the caregivers arms is not on the infant’s back of the head. Bottle feeding presents a nice opportunity for you to have eye contact with your infant. Feeding your baby is a very special time to hold, relax and make that parent-infant “bonding” and social connection.

### **Diapering**

Alternate the position of the infant on the changing table. When changing the diaper roll the infant side to side when fastening diaper tabs. Take this opportunity to place the infant on their tummy and massage their back.

### **Dressing**

Turn the dressing activity of the infant into exercise, “tummy time”, play and a bonding opportunity with your infant. Sing to the infant and name different body parts while accomplishing the dressing routine.

### **Bath Time**

Bath Time is an important sensory/motor activity in the routine infant daily care. The bath time routine affords itself for many opportunities for vision and touch sensation. The warmth of the water, the suds of the soap, as well as the terry feel of the washcloth all lend themselves to a different sensory experience for the infant. When drying the infant turn the infant on his/her tummy to dry his/her back. This is another opportune time to give baby a massage.

### **Carrying the Infant**

In the daily activity of life the parent has many ways in which the infant may be carried. The parent can alternate arms that the infant is carried in to allow for different sensory input as well as allow for the infant to turn their head in different directions. The baby may be carried in front of the parent looking out into the environment and/or positioned on their tummy supported by the caregiver’s forearm.

### **Baby Equipment**

Limit the amount of time that the infant spends in infant seating devices. Parent’s arms and “tummy time” awake and watched on the floor is best. Infant car seats are needed for safe transportation of the infant but should not be used beyond that to help eliminate the hard surface against a delicately developing head.

## **Head Positioning**

If the infant has a tendency to turn his/her head in one direction when sleeping, the parent should alter the head position ( i.e., gently turning the head). Infant daytime activity can be adjusted so to allow for midline positioning of the head. The infant's head should be checked weekly from the crown downward to assess for symmetry, roundness and no misshapen areas.

## **Bonding**

Each activity in the daily infant care routine provides for important attachment opportunities between the infant and his parent. If the daily care routine is performed in a loving manner and is sensitive to the infant's needs infants become securely attached to their parent and have a lifelong bonding effect.

## **Summary**

Whether playing with your infant or performing the necessary activities of daily living care routine, occupational performance is synchronous for the infant and the parent. The occupational performance of social interaction is intertwined between the infant and the parent. The occupational performance of the sleep pattern at periodic intervals has a cause and effect relation between infant and parent.

By being attentive to the infant's cues and the manner in which the infant daily care routine is performed parents can provide for their infant's needs. Being selective about the type of seating devices used with your infant and monitoring duration will ensure safety and minimize adverse effects.

“Back to Sleep” and “tummy time” are body positions to promote sleep safety and anti-gravity muscle movements. Mindful awareness of positioning in the

infant daily care routine can support the infants motor development while protecting the infant's head shape.

On behalf of your infant and the community we want to thank the parent's and the care providers for attending this education session on developmental care. Hold your infant and cherish this very special moment in time together, living, laughing and loving, sharing the joy that only a new little life can bring...

## MICROSOFT® POWER POINT® PRESENTATION CONTENT

### Infant Positioning and Its Effect on Development and Head Symmetry

#### Parent Educational Objectives:

1. Parents will identify proper infant body position for sleep as recommended by the American Academy of Pediatrics to aid in the prevention of Sudden Infant Death Syndrome.
2. Parents will identify the importance of “tummy time” in supporting motor development and head symmetry.
3. Parents will be able to demonstrate optimal infant positioning in the daily care routine of their infant to support motor development and head symmetry.
4. Parents will understand the potential influence of infant seating devices in relation to motor development and head symmetry.
5. Parents will demonstrate and verbalize awareness of two components that make up attachment behaviors and the lasting influence on the infants well being.

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#### “Back to Sleep Campaign”

Position infant wholly on their backs

Night time and Nap time

Do not let the infant sleep in car seats or swings or other seating devices

Inform other care providers

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## **“Tummy Time”**

Awake and watched

Start at birth

Preferably on the floor

Minimum of three times a day increasing the time as infant tolerates

Lie on the floor with your infant face to face

Toys, safety mirror, or music to motivate infant

Daily care routine (i.e., diapering, dressing, drying off after baby’s bath)

Snuggle Time on parent’s chest/shoulder –alternate

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## **Side-lying Positioning**

Play position on the floor

Awake and watched

Head midline

Hands to middle up by face

Body weight into shoulder and hip joints, increase sensory, touch input

Alternate sides each play session or during same play session

Toy, safety mirror, or music

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## **Feeding**

Breast feeding infant

Bottle fed infant –alternate position of infant in care provider’s arms

Position infant when bottled so that the back of the infant’s head is not getting pressure from the care provider’s arm

Burp infant upright on care provider shoulder alternating left/right shoulder

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## **Diapering**

Changing table-alternate position of the infant on the table

Roll the infant side to side when fastening the diaper tabs

Place the infant on his tummy and massage his/her back

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## **Dressing**

Exercise time

Tummy time

Body part identification awareness

Bonding

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## **Bath Time**

Sensory activity-touch, vision

Drying the infant off-turn infant onto his/her tummy

Infant back massage

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## **Carrying the Infant**

Alternate arms in which infant is carried

Promotes infant head turning

Turn infant out toward the environment/in toward parent

Place infant on their tummy supported by the parent's arm

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## **Baby Equipment**

Limit time spent in infant seating devices

Mandatory car seat

Don't allow infant to sleep in their car seat once destination is reached

Avoid hard surface against back of the infant's developing head (i.e., causes flattening of the head)

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## **Head Symmetry**

Visualize infant's head from the top down checking for roundness/symmetry and for any misshapen areas weekly

Alternate directions your baby's head faces (ex. foot of the crib/head of the crib, weekly)

If the infant develops a preference for turning his/her head to one side, gently turn head to the other side when infant is sleeping

Position infant in the environment as related to daily activity/stimulation such that you want him/her to turn his/her head toward the action or keep it in the middle, depending on his/her need

Limit time spent in seating devices that put pressure on the back of the infant's head

Alternate infant direction in care provider's arms when being bottled and/or held up by the parent's shoulder

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## **Bonding**

Infant daily care routine many bonding opportunities for infant/parent

Sensitivity of parent

Sensitivity to infant needs and being cared for

Secure attachment

Content infant/happy parent

Relationships in the future

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## Summary

Infants need your love and care

Hold them

Back to Sleep

Tummy time awake and watched, minimum 3 times a day

Watch their head shape

Limit seating devices

Infant daily activity routine, many opportunities for positioning

Support infant motor development and head symmetry

Bond to your infant; it will last a life time

Cherish this moment with your infant

## Back to the Basics

Evaluation follow up survey on parents and educational session

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
1. The learning objectives were met.	5	4	3	2	1
2. The learning materials were easily understood.	5	4	3	2	1
3. The presenter was effective in her presentation.	5	4	3	2	1
4. The information/demonstrations enabled me to more effectively support my infants development and head shape in the daily care routine.	5	4	3	2	1
5. Increased awareness of the importance of responding sensitively to the infant's cues in the daily care routine has promoted special attachment/bonding opportunities.	5	4	3	2	1
6. Fill in the blanks identifying three critical components to be kept in mind positioning your infant in the daily care routine.					
a. B_ _ _ t_ S_ _ _ _ (Back to Sleep)					
b. T_ _ _ _ T_ _ _ A_ _ _ a_ _ W_ _ _ _ (Tummy Time Awake and Watched)					
c. H_ _ _ S_ _ _ _ (Head Shape)					
7. Please rank the effectiveness of each teaching method:	Excellent	Very Good	Good	Fair	Poor
Microsoft® Power Point® Presentation	5	4	3	2	1
Demonstration/return demonstration	5	4	3	2	1
Question and answer period	5	4	3	2	1
8. Rank this parent/care provider education session	5	4	3	2	1
9. Further comments or suggestions:					

Thank you for completing this survey; this enables us to improve future presentations.

## CHAPTER V

### SUMMARY

The purpose of this scholarly project was to educate regarding the effects that positioning has on infant motor development and head symmetry as related to the everyday care routine and infant occupational performance. When speaking of the infant one must always consider the parent/care provider as a part of the dyad/triad relationship that supports the infant's performance. This Occupational Therapist and other colleagues began to note anecdotally that it appeared that infant motor development was emerging slower and in a different sequence than was expected. An increase in infant plagiocephaly also seemed to be on an increase and more and more children appeared to have mishapen heads and/or wore cranial orthosis helmets to aid in molding the head shape. What was observed clinically led this Occupational Therapist on a scholarly search to see if indeed this was true and to find research to prove or disprove what appeared to be so. This phenomenon of motor development and plagiocephaly seemed to be correlated and/or influenced by the timing of the American Academy of Pediatric's "Back to Sleep Campaign" to reduce the incidence of SIDS (AAP Task Force on Sudden Infant Death Syndrome, 2005). The incidence of SIDS indeed did decrease by 50% since the beginning of the "Back to Sleep Campaign" in 1992 (Aris, Stevens, LeMura, Lipke, McMullen, & Cote-Arsenault, 2006).

AAP and other health professions too, began to be concerned about infant motor development and the increase in the incidence of plagiocephaly. Although the “Back to Sleep campaign” is still recommended the AAP has endorsed the importance of “tummy time” awake and watched (2005). It seemed that many parents were overly concerned about putting their infant on their tummies anytime for the fear of SIDS. The infants often became conditioned to be on their backs and when positioned to their tummies parent’s reported that the infants did not want to be in this position and often times would cry, conditioning parents not to position them in that manner (AAP Task Force on Sudden Infant Death Syndrome, 2005).

The high availability of infant seating devices and prolonged use is another factor in the increasing rate of plagiocephaly and decreased motor development (AAP Task Force on SIDS, 2005). The hard surface against the infant’s occiput, the “Back to Sleep Campaign”, and delayed motor skill acquisition presented a combination of accumulating factors that appear to contribute to and may result in positional plagiocephaly. Infants placed in seating devices do not have a chance to have “tummy time” which enhances and strengthens anti- gravity motor movements.

The research evidence was found to support clinically what was observed and seen by other therapists and healthcare professionals, enough so that numerous research studies have been conducted to discern what some of the factors were leading to the causes of delayed motor development and plagiocephaly. It appears that motor delay seems to resolve by the time the infant is eighteen months old. It is more encouraging to know that if the infant is positioned for “tummy time” awake and watched beginning at a

young age that the likelihood of motor delay is less apparent. Parental and care provider holding is important to nurturing the infant not only emotionally but physically as well.

In the daily care routine, as suggested in “Back To The Basics” there are many ways that infants can be positioned to further enhance emotional and motor development while preserving the infant’s rounded head shape. Anytime research studies are done with human beings there are many factors and complexities to take into account thus making it difficult to get the quick and pure evidence that you need or want. In the meantime, an infant is only an infant once and time is of the essence and the future is forever. When a reoccurring varying developmental pattern draws your attention it seems that we as care providers of the infant need to take action; whether it be to seek out research for similar occurrences or to do research to find out why there is a pattern variability. Listening to that small intuitive voice inside, using our common sense and wisdom of the ages, and making adaptations to the environment that support our growing infants may too be the action to which one is called.

It has been proposed since the “Back to Sleep Campaign” that perhaps standardized developmental tests need to be restandardized as to the order and/or time frame in which developmental skills are coming forth so as not to create unnecessary referrals to rehabilitation therapy services. The challenge this Occupational Therapist proposed is not to have the test accommodate to the infant but rather that we position the infant to get back on to a time frame of motor skill acquisition that has more than stood the test of time. The neuromaturational theory is in support that the central nervous system unfolds in a sequential timely manner albeit influenced by the environment (Case-Smith, 2001). Now that motor delay and altered sequence has been brought to our



attention and some factors identified that seem to influence this phenomenon, more research should be conducted in how to rectify the issues. Proposed further research to identify the norm amount of time infants need to spend on their tummies awake and watched to allow for sequential and timely motor development. Further research to support how positioning in the daily care routine does affect motor development and head symmetry is also needed. Taking into the premise of the neuromaturational theory one wonders if the later acquisition/variable sequence of motor skills at a time the brain is rapidly developing will have an effect on sensory motor integration, learning and/or occupational performance in the infant's future years as well. Challenging and mandating licensed day care centers to have a minimum time each day that an infant is provided with the opportunity to have play time on the floor on their tummies while awake and watched along with having the time recorded should be provided as part of developmental care documentation given to the parent.

Every infant born deserves to have a chance to become the very unique special person they were meant to be and be provided with the support from their parents/care providers needed to become that. We can make one move toward that ideal by providing fifteen minutes of one-on-one education, demonstration to new parents, and providing them with a quick developmental reference guide upon discharge from the hospital. In this day of economic challenge in having enough healthcare monies to serve all in need, those few minutes spent in hospital education are a worthy investment in the health and well being of this new life about to blossom and unfold. Education and prevention are keys to supporting health. Keeping the information basic, practical and in a form that makes the information readily available as a resource and reminder to carry out the

positioning practices in the infant care routine can be most valuable. In this day of digital cameras and computers taking pictures of the parent demonstrating the positioning technique with their infant while performing the care routine in the hospital and presenting a personalized laminated copy of “Back To The Basics” would reinforce and motivate learning. Parents would be motivated to keep the materials as now it has personalized meaning and this basic information is set apart from the other materials they receive on their way out of the hospital doors. Perhaps, making the laminated information such that it would attach to the diaper bag, or hang on the changing table or door knob to serve as a visual cue may add to the compliance of carrying out the positioning techniques suggested to support development and promote head rounding. Perhaps, a prone pink girl/blue boy infant silhouette fob with a few basic reminders of the importance of “tummy time” and keeping the infant’s head symmetrical and well rounded is a basic but novel way to remind parents/care providers. An hour glass toy could be doubled as an infant rattle as well as a timing device to measure time and frequency of “tummy time” completed each day. One end of the hour glass rattle could have a silhouette of an infant’s rounded head as a reminder to also be aware to check the shape of their infant’s head; the other end could have a silhouette of an infant sleeping on their back as a reminder to parents of the “Back to Sleep Campaign”. Creating a “tummy time” floor mat with developmentally appropriate toys to enhance and entice the infants’ attention to promote longer “tummy time” efforts could be a possibility. Another idea would be disposable diapers with the front part of the waist band reading tummy to play and the back part of the waist band promoting the “Back to Sleep Campaign”. Onesie Infant T shirts with the “Back To The Basics” information on the front and back of the T

shirt could be a gift from their hospitals at the time of their infant's birth. The list of how to get the message out is endless and actually there is much literature available on the market, leading one to wonder why hasn't there been more compliance and awareness.

Politically, writing letters to the Health and Human Service State Departments in the United States expressing concern and ways to advocate for the infant may be a potential way to increase public awareness and gain support. Other ways to fund marketing include: writing for grants to create advertisement awareness via animated billboards, television ads, ads on grocery bags, diaper boxes etc., soliciting the March of Dimes to support preventative educational materials as a way to support postnatal care of the premature infant as an extension of their Prematurity Awareness Campaign.

It is necessary to ensure that the importance of positioning in the infant care routine to support development and head shaping is presented in healthcare and early childhood curricula as well as prenatal/postnatal classes in the hospitals. The concepts seem so simple and yet so basic but until they are carried out routinely during this critical formative period in the infant's daily care routine, they cannot impact and support infant development and head shaping as needed. The high incidence of premature infants born (1 in 8 births) (Martin, Hamilton, Sutton, Ventura, Menacker & Kirmeyer, 2006) each day makes this population even more vulnerable to environmental influences on their development and head shaping.

The "Tummy Time" awake and watched mantra must become as commonplace as the "Back to Sleep Campaign". Infant positioning in the infant daily care routine can have an effect on development and head symmetry. Together we can keep America's

babies well rounded. Proper care of the infant is everybody's "baby" and everyone's responsibility.

What long term effects does the plagiocephalic infant experience and how does that effect future occupational performance? Infants with moderate to severe plagiocephalic heads can have malalignment of the ears, eyes, jaw and cervical area. How may this have an impact on occupational performance and overall well-being? When it comes time to get fitted for a sport helmet; how will it fit? If significantly noticeable children may be teased or given nicknames. One wonders about the infants that were treated with cranial orthotic helmets and what affect that had on sensory input, cranial sutures, and perhaps even attachment and social engagement/interaction with others.

The hypothesis is often times formed far ahead of obtaining research results to support it. The importance of keeping your intuitive experiential self alive is critical in the day to day observation ( i.e., methodology) used to gather information and arrive at conclusions that truly may well have an influential effect on occupational performance. In an attempt to understand cause and effect one must look from various domains and process in an attempt to understand, intervene and effect occupational performance so to preserve quality and meaning to our daily lives whatever age and or stage of life.

## REFERENCES

- Abbott, A., & Bartlett, D. J. (2001). Infant motor development and equipment use in the home. *Child Care, Health and Development, 27*(3), 295-306.
- American Academy of Pediatrics Task Force on Sudden Infant Death Syndrome. (2005). The changing concept of sudden infant death syndrome: Diagnostic coding shifts, controversies regarding the sleep environment, and new variables to consider introducing risks. *Pediatrics, 116*, 1245-1255.
- American Occupational Therapy Association (2002). Occupational therapy practice framework: Domain and process. *American Journal of Occupational Therapy, 56*, 609-639.
- Aris, C., Stevens, T. P., LeMura, C., Lipke, B., McMullen, S., & Cote-Arsenault (2006) NICU nurses' knowledge and discharge teaching related to infant sleep position and risk of sids. *Advances in Neonatal Care, 6*(5), 281-294.
- Bartlett, D.J., & Fanning, J.E.K. (2003). Relationship of equipment use and play positions to motor development at eight months corrected age of infants born preterm. *Pediatric Physical Therapy, 15*(1), 8-15.
- Boere-Boonekamp, M. M., & Linden-Kurper, L.T. (2001) Positional preference: Prevalence in infants and follow-up after two years. *Pediatrics, 107*(2), 339-343.
- Bridgewater, K.J., & Sullivan, M.J. (1999). Wakeful positioning and movement control in young infants: A pilot study. *Australian Journal of Physiotherapy, 45*, 259-266.

- Callahan, C.W., & Sisler, C., (1997). Use of seating devices in infants too young to sit. *Archives of Pediatric Adolescent Medicine, 151*, 233-235.
- Case-Smith J. (2001) *Occupational therapy for children* (4<sup>th</sup> ed.). St. Louis, Missouri: Mosby, Inc.
- Davis, B.E., Moon, R.Y., Sachs, H.C., & Ottolini, M.C. (1998). Effects of sleep position on infant motor development. *Pediatrics, 102*(5), 1135-1148.
- Dewey, C., Fleming, P., & Golding, J. (1998). Does the supine sleeping position have any adverse effects on the child? Development in the first 18 months. *Pediatrics, 101*(1), 1-5.
- Dunn, W., Brown, C., Youngstrom, M., (2003). Ecological model of occupation. In Kramer, P., Hinojosa, J., & Royer, C.B., *Perspectives in human occupation* (pp. 222-262). Baltimore: Lippincott Williams & Wilkins.
- Goette, M. C., & Flander Stepan, M. B. (2001). First-time mother's selection of infant sleep positioning. *Journal of Perinatal Education, 14*(4), 16-23.
- Grenier, I. R., Bigsby, R., Vergara, E.R., & Lester, B. M. (2003). Comparison of motor self regulatory and stress behaviors of preterm infants across body positions. *American Journal of Occupational Therapy, 57*(3), 289-297.
- Gupta, R.S., Shuman, S., Taveras, E.M., Kulldorff, M., & Finkelstein, J.A. (2005). Opportunities for health promotion in child care. *Pediatrics, 116*(4), 499-505.
- Harris, B. (2001). Commentary: 'The child is father of the man.' The relationship Between child health and adult mortality in the 19<sup>th</sup> and 20<sup>th</sup> centuries. *International Journal of Epidemiology, 30*(4), 688-696.

- Jantz, J.W., Blosser, C.D., & Fruechting, L.A. (1997). A motor milestone change noted with a change in sleep position. *Archives of Pediatric Adolescent Medicine, 151*, 565-572.
- Losee, J. E., & Mason, A. C. (2005). Deformational plagiocephaly: Diagnosis, prevention, and treatment. *Clinics in Plastic Surgery 32*, 53-64.
- Majnemer, A., & Barr, R.G. (2006). Association between sleep position and early motor development. *Pediatric, 149*, 623-629.
- Martin J.A., Hamilton B.E., Sutton P.D., Ventura S.J., Menacker F., Kirmeyer S. (2006). Births: Final data for 2004. *National Vital Statistics Reports, 55*, 21-22.
- Miller, R., & Clairen, S. (2000). Long term developmental outcomes in patients with deformational plagiocephaly. *Pediatric, 105*,(2): E 26.
- Monson, R.M., Deitz, J., & Kartin, D. (2003). The relationship between awake positioning and motor performance among infants who slept supine. *Pediatric Physical Therapy, 15*, 196-203.
- Morrison, C.S. & Chariker, M. (2006). Positional plagiocephaly: pathogenesis, diagnosis, and management. *Journal of Kentucky Medical Association 104*, 136-140.
- Myers, C.T., Yuen, H. K., & Walker, K. F. (2006). The use of infant seating devices in child care centers. *American Journal of Occupational Therapy, 60*, 489-493.
- Pierce, D. (2000). Maternal management of the home as a developmental play space for infants and toddlers. *American Journal of Occupational Therapy, 54*(3), 290-299.
- Ratliff-Schaub, K., Hunt, C.E., Crowell, D., Golub, H., Smok-Pearsall, S., Palmer, P., et

- al. (2001). Relationship between infant sleep position and motor development in preterm infants. *Developmental and Behavioral Pediatrics, 22*(5), 293-299.
- Salls, J.S., Silverman, L. N., & Gatty, C.M. (2002). The relationship of infant sleep and play positioning to motor milestone achievement. *American Journal of Occupational Therapy, 56*, 577-580.
- Schenk, L.K., Kelley, J.H., & Schenk, M. P. (2005). Models of maternal-infant attachment: A role for nurses. *Pediatric Nursing, 31*, 514-517.
- van Vlimmeren, L.A., van der Graaf, Y., Boere-Boonekamp, M.M., L'Hoir, M.P., Helders, P.J.M., & Engelbert, R. H. H. (2007). Risk factors for deformational plagiocephaly at birth and at 7 weeks of age: A prospective cohort study. *Pediatrics, 119*(2), 408-418.
- Wendland-Carro, J., Piccinini, C. A., & Millar, W. S. (1999). The role of an early intervention on enhancing the quality of mother-infant interaction. *Child Development, 70*(3), 713-721.