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Head Orientation Preference in the Neonatal Intensive Care Unit:

Occupational Therapy's Role in Prevention and Treatment

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A Capstone Project Entitled

Head Orientation Preference in the Neonatal Intensive Care Unit: Occupational Therapy's Role in Prevention and Treatment

Submitted to the School of Occupational Therapy at University of Indianapolis in partial fulfillment for the requirements of the Doctor of Occupational Therapy degree.

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Abstract

Background Head preference may be influenced by various factors, and several developmental skills rely on midline positioning of the head. If left untreated, head preferences can lead to significant conditions, such as deformational plagiocephaly or torticollis.

Objectives The purpose of this project was to gather evidence, administer a needs assessment survey, and formulate a client-centered plan. Other objectives included implementing a new assessment tool, training the neonatal therapists in use of the tool, and creating an educational handout related to the topic.

Implementation The Infant Head Turn Preference Scale measures both direction and strength of head preference. Four neonatal therapists were trained in use of the tool, and the full assessment was completed on 20 total infants. Parents and caregivers were educated and provided with a handout to increase awareness of head preference.

Outcomes Neonatal therapists indicated they were comfortable and likely to administer the assessment in the future. The therapists strongly believed they had adequate resources to educate parents and caregivers on head preference.

Conclusion The findings suggest the assessment may be a practical tool to utilize with the infants and the educational handout proved to be a valuable resource for the neonatal therapists.

Literature Review

The purpose of this Doctoral Capstone Experience (DCE) was to increase knowledge regarding the role of occupational therapy (OT) in prevention and treatment of head orientation preference and related conditions in the Neonatal Intensive Care Unit (NICU). The screening and evaluation phase of this DCE involved gaining information through a needs assessment survey of the neonatal therapists concerning the current practices of head orientation preference prevention, as well as analyzing evidence gathered from research. Subsequently, this DCE involved implementation of the Infant Head Turn Preference Scale, formal and informal training of the neonatal therapists regarding the use of the tool, creation of a handout to be used to educate parents, and implementation of intervention strategies based on each infant's individual scores on the assessment tool (Dunsirn, Smyser, Liao, Inder, & Pineda, 2016). Overall, the goal is that the neonatal therapists continue to implement the Infant Head Turn Preference Scale and the parent and caregiver educational handout upon conclusion of this DCE in the effort to prevent and/or treat head orientation preferences before they develop into more significant conditions.

Ecology of Human Performance

The Ecology of Human Performance (EHP) model "emphasizes a preventative, healthpromotional, and rehabilitative attitude" (Cole & Tufano, 2008, p. 117), which directly relates to the importance of prevention and treatment of head orientation preference in the NICU. The main concepts considered in this model include the person, the task(s), and the context (Cole & Tufano, 2008). This model combines these components to define the personal-task-context transaction, or occupational performance, which was the ideal outcome of this DCE. Based on this DCE, the person was considered to be each infant in the NICU who was assessed and/or treated for head orientation preference. Each infant was treated as an individual, and the interventions were adapted as necessary. Each infant had a unique experience and different discharge considerations, so it was important as an OT practitioner to remember that the broad foundation of the condition often allowed for differing courses of intervention strategies for each infant.

The task, based on this DCE, was the administration of the Infant Head Turn Preference Scale and interventions as necessary based on the results. The interventions took place in the NICU, and parents, caregivers, and staff were given suggestions to aid in treatment, such as alternating the side of crib on which routine care was completed. Parents and caregivers were also provided with additional verbal education and handouts prior to discharge to reinforce generalization of concepts to home.

According to Cole and Tufano (2008), the context related to the EHP can be temporal or environmental, and the environmental aspects can be divided into physical, social, and cultural categories. The temporal contexts related to this DCE included gestational and adjusted age of the infant, developmental stage (muscle tone, reflexes, state control), and diagnoses. The physical environment included the NICU that the program is completed in. This was where the assessment tool and interventions were administered, and where parent and caregiver education took place. Parents and caregivers also had the opportunity to demonstrate understanding of materials while in the NICU environment. Educational material was also reinforced prior to discharge from the NICU, and the goal was to promote generalization of concepts to home and other relevant environments. The social environment in relation to this DCE included the significant relationships that the infant was a part of, which typically included parents, caregivers, other family members, and NICU staff. The cultural environment was typically decided by the parents or caregivers, and may have included but was not limited to spiritual, racial, or ethnic identity.

The overall goal of this DCE was to promote optimal personal-context-task transaction, also known as occupational performance (Cole & Tufano, 2008). Optimal personal-context-task transaction included successful prevention and/or treatment of head orientation preferences. This may eventually be measured through the site's NICU follow-up clinic, where infants who were patients in the NICU return for re-assessment of developmental milestones at two months, six months, and one year adjusted age. The clinic can record the number of infants they see with head orientation preferences, torticollis, and/or plagiocephaly, and compare that to the numbers that were seen prior to the initiation of this DCE. The goal is that with a formal assessment tool for early detection and consequently treatment of head orientation preferences, the clinic may see fewer infants with significant head preferences or related conditions as a result.

Head Orientation Preference

Head orientation preference in infants can encompass several factors and is best defined as the "preferred positioning of the head to one side, a strong push of the head into rotation to one side, and/or an inability to achieve or maintain the head in midline position" (Dunsirn et al., 2016, p. 53). According to Nuysink et al. (2013), there is a higher prevalence of head orientation preference in preterm infants as compared to term infants. If not properly addressed, head preferences in preterm infants may only be further reinforced by typical care routines in the NICU (Hummel & Fortado, 2005).

Researchers suggest that a variety of factors may lead to the development of head orientation preference. Medical treatments in the NICU, including endotracheal intubation or an

intravenous line located in the scalp can cause an infant's neck to be passively rotated to one side for an extended period, which may be a contributing factor to preferences (Dunsirn et al., 2016). Preferences may also be influenced by the intra-uterine environment, in which "a fetal vertebral column to the left of the mother is associated with a predominant head-position to the right" in infants with cephalic presentation during pregnancy (Fong, Savelsbergh, Van Geijn, & De Vries, 2005, p. 516). The extra-uterine environment can influence head orientation preference in instances when a parent, caregiver, or staff member tends to hold the infant on the same side each time, or routine care is completed on the same side of the crib each time in the NICU (Dunsirn et al., 2016; Nuysink et al., 2012). Developmental factors can also influence asymmetrical head orientation, as preterm infants have immature neuromotor systems and the weight of the infant's head attempting to fight gravity's strong pull is significant compared to underdeveloped neck muscles (Nuysink et al., 2012).

Several developmental skills rely on midline positioning of the head and support the importance of addressing head orientation preference before further concerns arise. According to Dunsirn et al. (2016), the development of a significant head orientation preference can impact function, including reflex patterns, muscle tone, visual orientation, and social interaction. The Moro reflex relies on midline positioning of the head as the head is dropped back slightly; therefore, a head orientation preference to one side may affect the infant's ability to display an age-appropriate response (Futagi, Toribe, & Suzuki, 2012). Conversely, a head orientation preference may also affect the asymmetric tonic neck reflex (ATNR) as it is elicited when the infant's head is turned to one direction, where the upper and lower extremities should extend on the side of the body the face is turned toward, and the extremities on the opposite side should flex (Lester, Tronick, & Brazelton, 2004). Head preferences may also result in asymmetric

movement, and the potential for other complications in posture such as torticollis and deformational plagiocephaly (Dunsirn et al., 2016).

Torticollis

The development of a significant head orientation preference over an extended period can sometimes lead to a condition known as torticollis. Torticollis can be defined as "involuntary flexion of neck into the affected side and rotation to the opposite direction...thereby resulting in the ear tilting toward the shoulder and chin turning in the opposite direction" (Tumturk et al., 2015, p. 1462). This flexion and rotation toward the affected side is the result of shortening or contracture of the sternocleidomastoid muscle in the neck and is a common musculoskeletal deformation in infants (He et al., 2017). Schertz, Zuk, and Green (2012) suggested that infants with a diagnosis of torticollis may be at a higher risk for later neurodevelopmental disorders, such as developmental coordination disorder and attention deficit hyperactivity disorder (ADHD). Early identification and intervention for head orientation preference is important to prevent limited range of motion (ROM) and fibrosis which can be associated with persistent torticollis (Hummel & Fortado, 2005).

Deformational Plagiocephaly

The presence of a significant head orientation preference is also a risk factor for the development of another condition known as deformational plagiocephaly. Plagiocephaly is defined as "atypical development of asymmetrical head shape in infants, where one side of the occiput is flattened, with or without associated forehead and facial asymmetries" (Leung, Mandrusiak, Watter, Gavranich, & Johnston, 2016, p. 31). Previously it was thought that this condition was purely cosmetic, but research suggests that infants with plagiocephaly have a higher likelihood of both psychomotor and cognitive developmental difficulties (Bialocerkowski,

Vladusic, Wei Ng, 2008). Once these children reach school-age, they often present with visualperceptual problems, language disorders, minor developmental delays, learning disabilities, attention deficit disorder (ADD), or other behavioral difficulties (Miller & Clarren, 2000; Panchal, et al. 2001). Balan et al. (2002) also suggested that numerous children who are diagnosed with plagiocephaly are at a higher risk of developing auditory processing disorders. Other risk factors for the development of plagiocephaly include assisted delivery, being a firstborn child, male sex children, multiplets, and other neck problems (Bialocerkowski et al., 2008; Nuysink et al., 2012). Prolonged external pressure to one area of the head is what ultimately causes plagiocephaly; therefore, it is important to vary the infant's feeding positions, position of head during sleep, and encourage tummy time activities when the infant is awake and supervised (Bialocerkowski et al., 2008).

Role of Occupational Therapy

An important role of the OT practitioner in the NICU is to "address the relationship between the infant's capabilities and the physical and social environment to foster the infant's optimal development," which includes encouraging the development of age-appropriate occupations, motor functions, sensorimotor processes, and behavioral regulation (Nightlinger, 2011, p. 243; Vergara et al., 2006). Occupations may include feeding, sleeping, and play, and motor functions may include muscle tone, reflexes, and ROM (Vergara et al., 2006). Sensorimotor processes and behavioral regulation can encompass all of the infant's developing sensory systems, quality of transitions between states, and self-regulation (Vergara et al., 2006).

Many important developmental skills rely on midline positioning of the head; therefore, OT practitioners can play a crucial role in the prevention and treatment of head orientation preferences in order to optimize development. Various positioning interventions may include alternating the direction of the head of the bed and the addition of positioning devices to maintain midline positioning of the head (Dunsirn et al., 2016). Head orientation preference may also be addressed in OT treatment through parent and caregiver education in order to promote generalization of treatment interventions from the NICU to home. Researchers suggest encouraging frequent changes in handling and play positioning, promoting symmetrical positioning of infant's head, alternating side of bed for care completion, and passive correction of head to opposite side if a preference becomes notable (Hummel & Fortado, 2005; Leung, Mandrusiak, Watter, Gavranich, and Johnston, 2017). It is also important to encourage parents and caregivers to allow the infant to spend adequate time in the prone position while awake and supervised, as this promotes lifting the head, strengthening neck muscles, and exploring the environment (Jones, 2004). In the prone position, head movement is less restricted, which can promote symmetry, but may also lead parents and caregivers to discover which side the infant has a strong head orientation preference toward. If this is the case, further interventions such as passive ROM stretches or soft tissue massage may be indicated to prevent progression and promote optimal function (Hummel & Fortado, 2005; Van Vlimmeren, Helders, Van Adrichem, & Engelbert, 2006).

Ultimately, infants in the NICU experience a high risk of developing head orientation preferences and related conditions as a result of medical treatments, environmental influences, and developmental factors, which reinforces the importance of early evaluation and treatment. If not detected and treated early enough, a head orientation preference can also develop into more complicated conditions such as torticollis or deformational plagiocephaly. The evidence suggests a need for a theoretical model and updated guidelines for practice regarding head orientation preference. The EHP model considers the infant as the person; the task included the administration of the Infant Head Turn Preference Scale and interventions as necessary, and the temporal and environmental contexts involved several influencing factors, which produced the personal-task-context-transaction. By conducting a needs assessment survey, this DCE was holistic and person-centered, and the use of evidence strengthened the rationale to improve the quality of care the infants received. The use of a formal assessment tool for early detection also allowed for early intervention, parent education, and generalization of concepts to home, as well as the potential for an overall decrease in number of infants seen in early intervention and outpatient services with torticollis or deformational plagiocephaly.

Screening and Evaluation

Upon arrival to Franciscan Health, I was approached by an OT practitioner who had recently attended a continuing education course during which the lead educator discussed the topic of head orientation preference and the recent development of a new assessment tool to measure it, entitled the Infant Head Turn Preference Scale. I conducted a literature search for evidence-based research related to head orientation preference independently and met with the OT practitioner to formulate a plan for the project, as well as create formal goals and objectives. This plan included: the administration of a needs assessment survey, implementation of the Infant Head Turn Preference Scale, training the neonatal therapists in use of the tool, and creation of a handout to educate parents and caregivers on the topic of head orientation preference.

Needs Assessment

A needs assessment survey was created based on reported problem areas in regard to head orientation preference and the anticipated project plan, which was peer-reviewed by an OT practitioner prior to administrative review. The survey was administered to four neonatal therapists at Franciscan Health and responses were received from all four. Two of the therapists were physical therapy (PT) practitioners and two were OT practitioners. Appendix A illustrates the needs assessment survey that was administered to the neonatal practitioners. All therapists answered "Yes" to the question, "Do you believe the NICU would benefit from having a quick assessment tool to measure head orientation preference?" Table 1 below displays the average answers to needs assessment survey questions on a five-point Likert scale, with a score of one indicating the least level of comfort, likelihood, or adequacy, and a score of five indicating the most. Based on the Likert scale, the therapists indicated that they felt comfortable with administering an assessment tool, they were likely to administer it on a regular basis, and they strongly believed that the NICU did not have adequate resources to support parent and caregiver education regarding the topic of head orientation preference.

Table 1

Average Needs Assessment Survey Responses on a Five-Point Likert Scale

Question	Needs Assessment
	Average
"How comfortable do you feel about the idea of implementing a	4.75
new assessment tool for measuring head orientation preference?"	
"How likely are you to use this tool on a regular basis?"	4.75
"Do you feel like you have adequate written/visual resources to	2
support your education to parents and caregivers regarding head	
orientation preferences?"	

The therapists were also asked two open-ended questions: "What intervention strategies do you believe the staff complete successfully to combat head orientation preferences?" and

"What could be improved in order to combat head orientation preferences more successfully?" Responses varied amongst therapists, as some believed that the staff were successfully alternating infant heads and head of beds and using gel pillow positioning devices effectively, while others felt this was unsatisfactory and could benefit from improvement. Other suggestions for improvement that were more consistent among surveys included the need for increased parent education, provision of routine care to both sides of the crib, and the desire for creation of educational handouts to support teaching with parents and caregivers.

The results of the needs assessment survey further reinforced the necessity of the elements of this DCE for this site and the neonatal therapy staff. The therapists strongly agreed that the NICU would benefit from the implementation of a formal assessment tool, they felt very comfortable with the idea of implementing the tool, and they were very likely to use the tool on a regular basis. The staff members were already extremely supportive of the use of the Infant Head Turn Preference Scale prior to being trained in its use, which reinforces the value of the assessment to this site and the staff. Another significant finding of the needs assessment was that the therapists believed they did not have adequate resources to support parent education on head orientation preference; therefore, the creation of an educational handout for parents and caregivers would be a valuable resource for both the neonatal therapists and the individuals being educated. Despite differing opinions on the strengths and weaknesses of the NICU staff in combatting head orientation preferences, an overall theme the survey demonstrated was a need for continued education staff members, parents, and caregivers on the importance of prevention and treatment of head orientation preference.

Infant Head Turn Preference Scale

13

Despite significant research regarding conditions that can result from head preference, few assessment tools exist to formally measure head orientation preference in order to create quantifiable goals and identify intervention strategies for infants in the NICU setting. The Infant Head Turn Preference Scale was developed in order to determine if head orientation preferences are correlated with NICU medical factors, associated with early infant neurobehavior, and/or a marker for developmental delays at two years of age (Dunsirn et al., 2016). This assessment tool measures both direction and strength of head orientation preference (Dunsirn et al., 2016). The examiner may only proceed with the assessment if the infant demonstrates a drowsy, quiet alert, or active alert state according to Brazelton and Nugent's states of arousal (1995). If the infant demonstrates a deep or light sleep state, the examiner should attempt to arouse if needed and if the infant demonstrates a crying state, the examiner should attempt to calm before proceeding (Dunsirn et al., 2016). If unable to arouse or calm infant, the examiner should defer formal testing of head orientation preference until the infant can reach a more ideal arousal state for best assessment results (Dunsirn et al., 2016). Assessment tool scores range from 0-10, with a greater score indicating a greater head preference (Dunsirn et al., 2016). Infants may fall into one of the following categories as a result of the assessment: no head preference, minimal head preference, moderate head preference, or significant head preference (Dunsirn et al., 2016). In addition to measuring head orientation preference at rest, amount of cervical rotation, and severity of head orientation preference, the scale measures restrictions in passive neck rotation and head orientation preference in a variety of positions (Dunsirn et al., 2016). Significant outcomes of the assessment indicated that a greater head orientation preference is associated with worse selfregulation and sub-optimal reflexes at 34 weeks' postmenstrual age, as well as lower Bayley

Scales of Infant and Toddler Development-Third Edition (Bayley-III) fine motor and expressive language scores at age two (Dunsirn et al., 2016).

Impact of Head Orientation Preference

Head orientation preferences that are left untreated may lead to diagnosis of further complications during NICU follow-up clinics, early intervention services, or outpatient pediatric therapy services. The most common diagnoses related to head orientation preferences are postural asymmetries, such as torticollis and deformational plagiocephaly (Dunsirn et al., 2016). Infants who demonstrate a need to attend follow-up clinics or receive therapy services following their discharge from the NICU participate in a variety of assessments chosen by an OT practitioner in order to evaluate the severity of the condition and create a client-centered treatment plan with appropriate goals.

Several formal and informal assessments exist to evaluate the presence and severity of torticollis. Informal assessment may include parent report, observation of head tilt, neck muscle strength, and craniofacial asymmetries, and palpation of the sternocleidomastoid and other neck muscles for tightness (Fradette, 2010). Formal assessment may involve measuring active and passive ROM, including neck rotation, flexion, and lateral flexion with use of a goniometer (Fradette, 2010). Other formal assessments include the muscle function scale, which quantitatively measures muscle function of the lateral neck flexors, and video-based pattern analysis, in which video documentation is used to analyze trunk convexity and cervical rotation deficits to determine if a torticollis pattern exists (Öhman, Nilsson, & Beckung, 2009; Philippi et al., 2006).

Deformational plagiocephaly may also be assessed through the use of informal or formal assessment. Similarly to torticollis, plagiocephaly may be informally assessed through parent

report and observation of craniofacial asymmetries (Fradette, 2010). Kennedy, Majnemer, Farmer, Barr, and Platt (2009) suggested the use of a log in which parents could record infant positioning over a specific period of time to determine how often infants spend in different positions throughout the day. Plagiocephaly may also be formally assessed through plagiocephalometry, in which skull asymmetries can by quantified and recorded over time (Van Vlimmeren et al., 2006).

Infants with head position preferences who attend NICU follow-up clinics, outpatient therapy services, or receive early intervention services in the home may also participate in the typical evaluation process to assess developmental progression. Assessment tools may vary between practice settings and sites; however, some common tools to assess development and motor skills include: the Hawaii Early Learning Profile (HELP), Bruininks-Oseretsky Test of Motor Proficiency-II (BOT-II), Peabody Developmental Motor Scales-II (PDMS-II), Bayley Scales of Infant Development-II and III (Bayley-II and Bayley-III), and Alberta Infant Motor Skills (AIMS). Although these assessment tools are not specifically designed to detect torticollis or deformational plagiocephaly, researchers have found correlations between the presence of these conditions and delays in development as evidenced by the results of these assessments. On the Bayley-III, infants with deformational plagiocephaly scored lower on the assessment at 36 months of age than unaffected infants, indicating that infants with plagiocephaly may be at a higher risk for developmental delay (Collett et al., 2013). Öhman, Nilsson, and Lagerkvist (2009) found that infants with torticollis scored significantly lower on the AIMS compared to a control group, putting them at a higher risk for delay in early motor milestones; however, the authors suggested this may have also been influenced by limited time spent in prone while alert and supervised.

Specific developmental difficulties that may be seen in NICU follow-up clinics, early intervention, or outpatient pediatric therapy associated with deformational plagiocephaly may include visual-perceptual problems, language disorders, minor developmental delays and learning disabilities, ADD, auditory processing disorders, or other behavioral difficulties (Balan et al., 2002; Miller & Clarren, 2000; Panchal, et al. 2001). Infants who are diagnosed with torticollis may be at a higher risk for neurodevelopmental difficulties, such as developmental coordination disorder or ADHD (Schertz, Zuk & Green, 2012). Other complications of leaving torticollis and deformational plagiocephaly untreated include severe shortening and fibrosis of the sternocleidomastoid muscle and craniofacial deformities (Lee et al., 2012; Wong, Lo, & Chen, 2003).

With this in mind, it is particularly important to provide treatment to infants, as well as parent and caregiver education as early as possible. If parents or caregivers are not properly educated while their infant is still in the NICU, their infant may be more likely to require additional therapy services for more severe conditions after discharge. It is important to educate parents and caregivers that it is safe to place their infant in prone when they are awake and alert, as infants may lack adequate tummy time due to emphasis being placed on "Back to Sleep" practices (Jones, 2004). It is also essential to emphasize to parents that it is best to incorporate tummy time into the infant's routine as soon as possible so they can become accustomed to it and begin to build strength in neck and other associated muscles. Parents and caregivers may also be unaware of the risks of placing an infant in different types of equipment for extended periods of time. Although they may understand not to leave an infant in a car seat for long periods of time, they may not understand that alternating between a car seat, stroller, swing, and bouncer seat still exposes the infant to the same position over an extended period of time and can lead to the

development of torticollis or plagiocephaly. Parents and caregivers may also simply be unaware of tips and tricks that can prevent these conditions, such as varying holding and feeding positions, alternating head of bed, and incorporating the use of faces, books, pictures, baby safe mirrors, and toys to promote symmetrical head movement as the infant's visual system matures.

Implementation Phase

Setting

This DCE was implemented at Franciscan Health within the NICU setting. Each portion of the implementation phase was incorporated into infant care and parent education throughout the infant's stay. This allowed for holistic, client-centered care and education to be provided within individual rooms and allowed for more privacy for the parents and caregivers during the implementation phase. The intention was that although these assessments, interventions, and parent education were provided within the NICU setting, the parents and caregivers have retained enough of the information to generalize to the home setting.

Population

Sections of the Infant Head Turn Preference Scale were practiced on several infants in the NICU; however, the full assessment was completed on 20 total infants. The population included infants ranging from just over 33 weeks adjusted age to just over 41 weeks adjusted age, as well as their parents and caregivers who were involved in the education process. Appendix B best illustrates infant demographics, however some of the most common diagnoses at time of assessment included prematurity, apnea of prematurity, neonatal abstinence syndrome (NAS), respiratory distress syndrome (RDS), infant of diabetic mother (IDM) and hypoglycemia. Infants were excluded from participation in the Infant Head Turn Preference Scale if the infant's adjusted age was younger than 32 weeks, if the infant required higher than nasal cannula for

respiratory support, or if the infant could not tolerate being placed in prone suspension for 15 seconds.

Assessment and Intervention

Assessment involved administration of the Infant Head Turn Preference Scale if the infant was above 32 weeks adjusted age, required a nasal cannula or less for respiratory support, and was able to tolerate being placed in prone suspension for 15 seconds. Occasionally, the assessment was administered at initial evaluation along with the standard evaluation. Other times, the assessment was administered at the beginning of a typical treatment session. An important part of proper administration of the tool was arriving to the infant's room before the nursing check was initiated to ensure adequate observation of required items. This was critical as the first test item required the infant to be observed at rest while swaddled and supported, which must happen before the nurse arrives to the room and initiates routine care (Dunsirn et al., 2016). Another assessment tool item required observation of the infant during a diaper change with sandbags on each side of the head, which also required being present for the nursing check and being prepared with sandbags to observe the infant's active head movements against them during the diaper changing task (Dunsirn et al., 2016). Scoring involved averaging the scores of the first four items, then adding that score to the scores of the last two items. The total score determined whether the infant demonstrated no, minimal, moderate, or significant head orientation preference as well as direction of preference. Based on the score obtained from the Infant Head Turn Preference Scale, a holistic, client-centered intervention plan was created for each infant.

For infants who scored minimal head preference, intervention typically included alternating direction of the head of the bed every other day, incorporating tummy time, and varying infant position in the isolette or crib at each nursing check. Nursing staff members were also made aware of the infant's head preference and were included in the intervention strategies. Parents and caregivers were educated and provided with an informative handout to increase their awareness of head orientation preference, possible causes of head orientation preference, developmental skills that rely on midline orientation of the head, and the risks of leaving preferences untreated. The handout also included information regarding positioning techniques, such as varying positions, alternating side of crib for routine care, early tummy time when the infant is awake and supervised, and additional resources for parents regarding tummy time. Lastly, the handout included environmental adaptations, such as alternating direction of the head of the bed, limiting time the infant spends in equipment, and incorporating use of faces, pictures, baby safe mirrors, and toys to encourage attention to both sides as the infant's visual system matures. Appendix C illustrates the handout used to educate parents during the implementation phase of this DCE. Parents and caregivers were also exposed to demonstration of how to place their infant in the prone position for tummy time, and were also given opportunities to practice this in order to increase caregiver competency and comfort levels with the activity.

On the rare occasion that infants scored moderate to significant head preference, the infants and parents received the same treatment and education as those who scored minimal head preference. However, the infants additionally received therapeutic touch interventions, including passive stretching and massage to the affected side of the neck. Passive stretches were completed at each nursing check by either nursing staff or therapy if present for treatment session. Massage was typically completed one time per day during therapy treatment sessions; however, if parents were present often, they were educated on stretching and massage techniques and encouraged to complete both techniques with each nursing check.

Leadership Skills and Staff Development

The implementation phase of this DCE required the use of several important leadership skills, including communication and building trust, responsibility, displaying expertise and developing others, giving and receiving feedback, and flexibility. I believe that the use of these skills helped the neonatal therapists and me become more proficient in the administration of the Infant Head Turn Preference Scale, and assisted in the development and implementation of the educational handout for parents and caregivers.

The implementation of the Infant Head Turn Preference Scale required effective communication between neonatal therapists, as well as between therapist and parents or caregivers of the infants. Throughout the process, therapists often communicated with each other regarding what was going well or what was proving to be more difficult during administration of the assessment tool. At the beginning of the implementation phase, it was noted that the assessment tool did not specify a time period in which to observe the infant in each position, so the therapists collectively decided to observe each infant for approximately 15 seconds in each position with the goal of increasing consistency between therapists who administered the assessment. Communication was also an important skill when educating parents and caregivers, as it was important to build a relationship in order to ensure the parent or caregiver fully trusted and followed through with the education.

Responsibility also played a vital role in this DCE, as this experience required spending significant time being self-directed and advocating for the project. This specific leadership skill allowed me to take charge of many aspects of the experience but also allowed me to seek assistance and advice from other therapists along the way. It was important that motivation was maintained throughout, and the other neonatal therapists assisted in maintaining that motivation by being invested in the process.

Another important aspect of the implementation phase was displaying expertise and developing others. It was important to display expertise during the assessment and intervention process, which included proficiency during implementation of the Infant Head Turn Preference Scale, competency with interventions and parent or caregiver education, development of a quality educational handout to enhance learning, and preparation for potential questions asked by parents and caregivers. In comparison, the development of the expertise of others was directly related to one of the objectives of this DCE, which states that NICU staff will be trained in the use of the Infant Head Turn Preference Scale. The neonatal therapists were trained in the use of the assessment tool through one-on-one instruction as well as a formal in-service training session. One-on-one instruction involved one neonatal therapist and I practicing implementation of the assessment tool with the infants in the NICU, practicing scoring the assessment, and giving and receiving feedback in order to improve the training process. The formal in-service training involved all four neonatal therapists, and entailed a handout and presentation on the assessment tool, tips and tricks for implementation of the tool, education regarding the SmartPhrase that was created for documentation of assessment tool results, and a brief discussion on the parent and caregiver educational handout. Time was allotted at the end of the session for questions from the therapists and to allow the therapists to fill out the post-implementation survey. The goal was that the therapists felt comfortable and competent with administration and will continue the use of the tool after the conclusion of this DCE.

Giving and receiving feedback was also important during this DCE, as this was a learning experience for everyone involved. Feedback was given to the neonatal therapists on what could be done to improve their administration of the assessment tool, such as increasing the number of infants to which the Infant Head Turn Preference Scale is administered and incorporating the parents or caregivers into the assessment. Feedback was also received throughout the training process regarding how to improve overall administration of the assessment tool, including placing the infant's head in midline prior to observation of each item, facing the infant toward the therapist and directing auditory and visual stimuli toward midline, and ensuring the bed angle was at zero degrees. Additionally, the neonatal therapists were asked to provide feedback regarding the training they received, and all of the therapists felt that both the hands-on practice and the in-service training were adequate.

Lastly, flexibility was a major theme throughout this experience. In the NICU setting, infants are seen for treatment at nursing checks based on scheduled feeding times; however, creating a schedule is not always possible due to multiple possible scenarios. It is also important to note that some parents are regularly present in the NICU, while others are seen for the first time on the day of discharge, which can make parent education more challenging. It was important to remain flexible and understand that schedules, evaluations, treatments, and parent education may not always go as originally planned.

Discontinuation and Outcomes

As the DCE reached conclusion, outcomes were assessed and plans were put in place for the discontinuation process of the experience. Outcomes were assessed through the use of a postimplementation survey in order to determine the effectiveness of the strategies employed during the implementation phase. The discontinuation phase included methods for continuous quality improvement, response to society's need, and strategies for sustainability.

Outcomes

A post-implementation survey was created based on the initial needs assessment survey and the implementation phase in order to adequately measure the goals and objectives of this DCE. This survey was also peer-reviewed by an OT practitioner prior to administration. The survey was administered to the same four neonatal therapists at Franciscan Health who participated in the needs assessment survey, and responses were received from all four. Appendix D illustrates the post-implementation survey that was administered to the neonatal practitioners and Table 2 below displays the average answers to post-implementation survey questions on the same five-point Likert scale that was used during the needs assessment survey. Based on the Likert scale, the therapists indicated that they felt comfortable with administering an assessment tool, and they were likely to administer it on a regular basis. The biggest difference between needs assessment and post-implementation responses was that at post-implementation, the therapists strongly believed that the NICU had adequate resources to educate parents and caregivers on head orientation preference after the creation of the parent handout.

Table 2

Average	Post-Imp	olementation	Survey	Responses (on a Five	-Point	Likert	Scal	e
0			~	1					

Question	Post-Implementation
	Average
"How comfortable do you feel implementing the Infant Head Turn	4.5
Preference Scale to measure head orientation preference?"	
"How likely are you to use this tool on a regular basis?"	4.75
"Do you feel like you have adequate written/visual resources to	5
support your education to parents and caregivers regarding head	
orientation preferences?"	

The therapists were also asked three open-ended questions: "What do you like about the assessment tool?" "What do you dislike?" and "Do you feel anything could have been done to better prepare you to administer the assessment tool?" Common positive feedback included that the tool gave an objective measurement to assist in assessment of the infants, staff and parent education, and documentation, and that the assessment was easy to perform. One therapist commented on occasion infants may present with low muscle tone or weakness in which the head falls to one side or the other simply by chance versus a true head orientation preference, so it is important to be able to recognize the difference. All four neonatal therapists also believed they were adequately trained and did not feel anything else needed to be done to better prepare them to administer the assessment tool. Another therapist stated that both the one-on-one instruction and the formal in-service were very helpful and she plans to increase use of the tool in daily practice in order to become more comfortable with administration. The therapists were also prompted at the end of the survey to provide other feedback or ask questions as they felt necessary. One therapist who provided feedback regarding the in-service training stated that it was helpful to work through the process as a group in order to ensure consistency between therapists. Another therapist who provided feedback about the assessment tool stated, "Thank you! We will definitely be using this tool." Overall, the results of the post-implementation survey indicate that the neonatal therapists believed that the Infant Head Turn Preference Scale is a practical tool for the NICU, they plan to continue use after conclusion of the DCE, and they believed the handout that was created is a valuable resource to educate parents and caregiver about the topic of head orientation preference.

Continuous Quality Improvement

Strategies for continuous quality improvement (CQI) were implemented at this site from the beginning of the DCE. For example, the basic concepts of strengths, weaknesses, opportunities, and threats (SWOT) analysis were initially incorporated into the needs assessment survey that was completed by the neonatal therapists (Helms & Nixon, 2010). Through this type of analysis, "planners can better understand how strengths can be leveraged to realize new opportunities and understand how weaknesses can slow progress or magnify organizational threats" (Helms & Nixon, 2010, p. 216). The use of the needs assessment survey at the beginning of the screening and evaluation process allowed the neonatal therapists and me to process strengths and weaknesses related to prevention and treatment of head orientation preference in the NICU. The use of the five-point Likert scale led to discovery of a weakness in the area of resources for parental education. If the strengths continued to progress, they would likely promote opportunities for optimal growth and development of the infants. In contrast, if the weaknesses continued to progress, they would likely become threats that could hinder optimal developmental and quality of care. By addressing these items in the needs assessment survey through SWOT analysis, the results highlighted key areas that required improvement and became the focus of the implementation phase.

The element of SWOT analysis was also incorporated into the post-implementation survey in order to re-visit the items addressed in the needs assessment survey and analyze the effectiveness of the implementation phase. The topic of resources for parent and caregiver education was viewed as a weakness at the initiation of this DCE; however, as indicated by the post-implementation survey, it has turned into a strength overtime through the development of the parent and caregiver education handout. It is important to recognize that despite this becoming a strength through this DCE process, the neonatal therapists will need to continue to be intentional about the implementation of the Infant Head Turn Preference Scale and the educational handout upon conclusion of this DCE.

Another method of continuous quality improvement that was incorporated into this DCE was increasing consistency between therapists when implementing the Infant Head Turn Preference Scale. This was done by agreeing upon a 15 second time frame for observation of each of the first four items on the assessment tool, as there was not originally a set time frame indicated by the writers of the tool. Scoring of items required the infant to demonstrate an angle of deviation from midline either "25% of the time," or "75% of the time," and the addition of a time frame allowed for a more concrete definition for scoring and more consistency between therapists (Dunsirn et al., 2016, p. 58). The remaining two items on the assessment tool involved observing the infant's active head movements during a diaper change and assessing for restrictions in passive neck ROM and therefore did not require a timeframe for observation.

Future plans for quality improvement were also discussed during the discontinuation phase of this DCE. The neonatal therapists were trained on the Infant Head Turn Preference Scale, but we also discussed the potential for including the nurses in the training, as they are also involved in implementing intervention techniques for the prevention and treatment of head orientation preferences. Since it is a brief assessment tool and it requires being present before the infant is disturbed and unswaddled, it could be a simple tool for the nurses to use during routine care completion.

Response to Society's Need

Other than the Infant Head Turn Preference Scale, only one other assessment tool exists to measure infant head orientation preference and is known as the head orientation profile (Leung et al., 2016). The Infant Head Turn Preference Scale was selected because it was determined to be a quicker and easier assessment to implement when compared to the process developed by Leung et al. (2016). Both assessments have the ability to measure direction of head orientation and strength; however, the Infant Head Turn Preference Scale involved simpler calculations allowing for quicker implementation and specified categories of no, minimal, moderate, and significant head preference in addition to a strength score. The neonatal therapists at Franciscan Health were searching for the quickest and simplest assessment tool to integrate into standard evaluations, so the Infant Head Turn Preference Scale was chosen in response to the site's needs.

The neonatal therapists at Franciscan Health also indicated the need for a parent and caregiver educational handout during the needs assessment process; therefore, I responded to the site's need by creating and implementing an educational handout. Both the site and the population served responded well to this handout, and the parents and caregivers seemed to be receptive to the information. The handout may be revised in the future as further needs arise.

Lastly, this DCE responded to society's need by providing the best quality of care possible for the infants in the NICU at this site. As healthcare providers, it is our responsibility to treat the infant holistically and address areas that need improvement. Through the use of the Infant Head Turn Preference Scale and the parent and caregiver educational handout, improved quality of care is being provided in regard to the prevention and treatment of head orientation preferences in the NICU setting at Franciscan Health. The goal is that in response to society's needs, we may reduce the incidence of more significant conditions such as deformational plagiocephaly or torticollis in the future.

Sustainability

Plans for sustainability of the items addressed in this DCE were also discussed during the discontinuation phase of the experience. Sustainability of this DCE will continue to rely on the individuals involved in the process and their dedication toward the goals and objectives of the project. After the OT student has left Franciscan Health, it will be the job of the neonatal therapy staff to maintain commitment to implementing the Infant Head Turn Preference Scale, use the handout that was created to educate parents and caregivers, continue to implement intervention strategies for the prevention and treatment of head orientation preferences, and preserve the process of continuous quality improvement in order to ensure the greatest quality of care is provided. The most effective methods for reaching sustainability of this DCE are through resource stabilization, objectives fit and internal support, and community outreach and education (Pluye, Potvin, Denis, Pelletier, & Mannoni, 2005; Workforce GPS, 2016).

Resource Stabilization

According to Pluye et al. (2005), sustainability of a program is encouraged by stabilization of the resources required to maintain the program. This DCE will be easily maintained with minimal resources at a low cost to the site. The Infant Head Turn Preference Scale can be found via an online database search for the Dunsirn et al. (2016) article, and printed anywhere in the NICU department. Several copies have been printed and are stored with other therapy-related evaluation forms. The parent and caregiver educational handout was created by the marketing department at Franciscan Health at a low cost that was also charged to the NICU department. Several copies of this handout have also been printed and are stored along with other educational handouts that are often used by the therapy department. Additional copies of the assessment tool and/or parent handout can also be obtained in bulk at an even lower cost from the print shop department at Franciscan Health and will be charged to the NICU department.

Objectives Fit and Internal Support

Also, according to Pluye et al. (2005), a program is more likely to be sustainable if the program objectives fit with the values of the organization and staff. The major objectives for this program were to gain knowledge and evidence-based research regarding head orientation preference, implement the Infant Head Turn Preference Scale, train the staff in the use of the tool, identify ways to prevent and treat head orientation preference, and create a parent and caregiver educational handout on the topic. However, the overall theme of the above objectives is that an OT practitioner saw a need, and advocated for a project that would provide the most holistic, high quality care that the infants and their families deserved. This directly aligns with Franciscan Health's mission of: "Being advocates for those in need, providing a broad, coordinated continuum of health care services with an emphasis on improving the health of persons and communities, treating the mind, body and spirit with holistic and comprehensive medical options" (Franciscan Health Inc., 2018). Given that this DCE project aligns well with Franciscan Health's mission, this increases the likelihood for sustainability of the project.

Another way to maintain program sustainability is by obtaining internal support (Workforce GPS, 2016). For this DCE, there has been internal support from the neonatal therapists throughout the duration of the project. They are supportive of the project, and they seem to be willing to continue to maintain the process after the conclusion of the experience. I would like to obtain more internal support from the nursing staff. They are protective of the infants in their care, and many of them have a specific routine they go through during each nursing check, so at times it was difficult to convince them to modify their habits to allow for the implementation of the Infant Head Turn Preference Scale. Ideally, this internal support would be best obtained simply through increased education on the purpose and importance of the assessment tool. With the support of the neonatal therapists and increased acceptance of the nursing staff over time, this increases the prospect of sustainability for this DCE project.

Community Outreach and Education

Lastly, sustainability of this program may be assisted through community outreach and education (Workforce GPS, 2016). As stated above, this may involve informally educating nursing staff and other professions about the purpose and importance of implementation of the Infant Head Turn Preference Scale and the parent and caregiver educational handout. Other ways this may be accomplished in the future is by hosting in-service sessions to more formally educate other health professionals about the assessment tool, as well as informal educational sessions for parents and prospective parents, caregivers, and other members of the public to attend and learn more about the topic of head orientation preference and ways to prevent and treat the condition at home. The most important point is to increase awareness of the assessment tool for healthcare professionals. It is important to increase education about the elements of this DCE for program sustainability; however, it is also important to increase education on the topic of head orientation preference itself, especially to non-healthcare professionals in order to promote proactive behavior and increase prevention of head orientation preferences and other conditions.

Overall Learning

Overall through this experience I have gained a great amount of knowledge and clinical skills regarding the practice of OT in the NICU setting, as well as the topic of head orientation preference. I learned from evidenced-based research, textbooks, several mentors, and most importantly the parents, caregivers, and infants in the NICU throughout my time at Franciscan Health. I had the opportunity to study the Infant Head Turn Preference Scale, a fairly new

assessment tool, and was able to teach the other neonatal therapists about the tool which further facilitated my learning. I also learned from evidenced-based research in order to create a foundation for this DCE project, and utilized it to formulate the parent and caregiver educational handout. In addition, I learned from the parents and caregivers along the way as they made comments and asked questions throughout their learning processes. Lastly, I learned from the infants, who were the most important part of this process and the center of this holistic plan for prevention and treatment of head orientation preference. Overall, I believe I maintained a professional approach throughout this DCE, while also developing several valuable connections and relationships. The NICU setting was intensely complicated, but allowed me to be involved in providing high-quality care and have a lasting impact on the infants and families who participated in this DCE.

Communication

Neonatal Therapists

I believe I demonstrated effective communication with the other neonatal therapists who served as my mentors during my time in the NICU. I feel that I exhibited professional oral, written, and non-verbal communication during my interactions with each of the four therapists in person, as well as through written communication such as the needs assessment and postimplementation surveys, and e-mail. The therapists and I asked each other questions and exchanged feedback on several occasions, which I felt were effective methods to keeping lines of communication open and honest. I believe I was able to build rapport and lasting relationships with therapists who will continue to serve as my mentors as I begin my career as an OT practitioner. Effective communication was critical to many interactions with the neonatal therapists throughout my time at Franciscan Health, but perhaps the most important was my communication during both formal and informal training in use of the Infant Head Turn Preference Scale. I believe I exhibited professionalism during individual informal training, in which there was always open communication, time for questions, and opportunities to give and receive feedback while practicing the assessment tool. I also displayed effective and professional communication during the formal in-service training, in which I was required to exhibit competency with the assessment tool in order to properly train the neonatal therapists. There was also time allowed for questions and feedback during the formal training, as well as the use of the post-implementation survey for additional feedback. I believe I was able to receive both positive feedback and constructive criticism well, and the information received can be used to further improve the implementation process in the future.

Other Healthcare Providers

I also strongly relied on the relationships I built with other healthcare providers throughout my time in the NICU as we worked closely with them on a routine basis. One group of healthcare professionals with whom I believe I demonstrated effective communication and established professional relationships with was the nursing staff. In the NICU setting, the nursing staff can be protective of their infants so it is important to gain their trust, respect, support, and often collaborate with them when providing care to the infants. Additionally, some of the nursing staff have a very specific routine they prefer to maintain during nursing checks, so it was important during this DCE to effectively communicate and educate them regarding the purpose and significance of implementing the Infant Head Turn Preference Scale in order to encourage them to modify their routine. On occasion, I also worked closely alongside other healthcare professionals, such as neonatologists, neonatal nurse practitioners, respiratory therapists, speech therapists, social workers, and medical interpreters. It was important to develop effective oral and non-verbal communication with these professionals, respect each other's time constraints, and oftentimes collaborate in order to provide the highest quality of care to the infants and their families.

Lastly, I believe I exhibited professionalism in my written e-mail communication with the marketing department at Franciscan Health during the process of finalizing the parent and caregiver educational handout. The marketing department was responsible for transforming the rough draft of the handout into the final product with the Franciscan logo on it, so it was vital to establish an effective manner for communication. This ensured that our needs were met, in addition to respecting the requirements set forth by Franciscan Health that the marketing department must follow for the creation of educational handouts.

Parents and Caregivers

I believe that I exhibited effective communication with the parents and caregivers throughout this DCE. Oral and non-verbal communication involved education regarding the purpose, process, and results of the Infant Head Turn Preference Scale and providing the parents and caregivers with strategies for preventing and/or addressing head orientation preferences. Written education was also provided to the parents and caregivers in the form of the parent and caregiver educational handout after being educated verbally on the information, and the individuals were given the opportunity to ask questions if necessary. In addition to providing education, I believe it was imperative to build relationships with the parents and caregivers through the use of effective communication in order to gain their trust, respect, and support for treating their infant, similar to relationships built with the nursing staff. Many of these parents and caregivers were experiencing an extremely stressful, sometimes unexpected time in their lives, so it was important to keep an open line of communication with parents and caregivers, keep them informed, and include them in as much of the process with their infant as possible.

Infants

Lastly, I feel that effective communication with the infants was vital to the DCE process. Effective oral and non-verbal communication with these infants varied from therapeutic touch and use of oral stimulation for calming purposes, to visual input and auditory stimulation to increase alertness during implementation of the Infant Head Turn Preference Scale. For proper administration of the assessment tool, the authors indicated that the therapist may only proceed if the infant demonstrates a drowsy, quiet alert, or active alert state (Brazelton & Nugent, 1995; Dunsirn et al., 2016). The purpose of implementing the communication techniques described above was to increase the infant's level of arousal or to calm the infant in order to reach an ideal arousal state for the most valid assessment results. Therapeutic touch included use of containment or firm, but gentle press holds, and oral stimulation included offering a pacifier for calming. Visual input included the use of the therapist's face for visual stimulation and auditory stimulation involved verbal communication to increase alertness during the assessment. Visual and auditory stimulation was always provided with the infant facing the therapist and at the infant's midline head position as not to influence head orientation preferences with additional input to one side.

Conclusion

The findings from this DCE suggest that the Infant Head Turn Preference Scale may be a practical tool to utilize with the infants in the NICU, and the parent and caregiver educational handout proved to be a valuable resource for the site and the neonatal therapists. The goal of

35

implementing these resources was to promote early detection and intervention of head orientation preferences, as well as to promote parent and caregiver awareness, allow for their participation in prevention and treatment, and encourage generalization of concepts postdischarge. It is clear that OT practitioners play a critical role in the prevention and treatment of head orientation preferences. The overall goal of this DCE was to promote optimal occupational performance, which included successful prevention and/or treatment of head orientation preferences. Promotion of optimal occupational performance required careful consideration of each infant and their individual contexts prior to determining the appropriate course of assessment and intervention "tasks". Through proper use of the Infant Head Turn Preference Scale, appropriate intervention strategies, and comprehensive parent and caregiver education, the neonatal therapists worked to reduce the impact of head orientation preferences on infants in the NICU; therefore, overall occupational performance was improved for each infant who participated in the DCE. Long-term use of these strategies may allow OT practitioners to influence a decrease in more significant conditions seen in NICU follow-up clinics, early intervention services, or outpatient pediatric therapy services, which would continue have a positive impact on the overall occupational performance of these infants. Further research may be conducted to assess the specific effect these strategies have on the number of cases of more severe diagnoses, such as torticollis and deformational plagiocephaly, that are seen in therapy services post-discharge from the NICU setting.

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Appendix A.

Infant Head Turn Preference Scale Needs Assessment Survey

Date:								
Department:								
Do you believe the NICU would benefit from having a quick assessment tool to measure								
head orientation preference?								
Yes No Maybe								
How comfortable do you feel about th idea of implementing a new assessmen tool for measuring head orientation preference?	e nt 1	2	3	4	5			
How likely are you to use this tool on a regular basis?	a 1	2	3	4	5			
Do you feel like you have adequate written/visual resources to support yo education to parents regarding head orientation preferences?	ur 1	2	3	4	5			

What intervention strategies do you believe the staff complete successfully to combat head orientation preferences?

What could be improved in order to combat head position preferences more successfully?

Thank you for your time!

Needs Assessment Survey. This figure illustrates the needs assessment survey administered to

four neonatal therapists.

Appendix B.

This table illustrates the demographics of the infants involved in this experience at the time of assessment.

Infant	Gestational Age	Adjusted Age	Diagnoses
1	33+4	37+6	Prematurity, hypoglycemia, twin A
2	33+4	37+6	Prematurity, hypoglycemia, twin B
3	34+5	35+1	Prematurity, mother with eclamptic seizure while
			infant in utero, RF, RDS, hyperbilirubinemia
4	31+3	38+6	Prematurity, HTN, dysphagia, IDM
5	39+0	41+1	Mother's abdomen was struck two times while
			infant in utero, IUGR, NAS
6	34+1	35+0	Prematurity, IDM, polycythemia, apnea of
			prematurity, mild ventricular hypertrophy
7	33+3	36+0	Prematurity, cleft soft palate, vaginal mass
8	31+5	34+5	Prematurity
9	37+0	38+4	RDS, anomaly of rib, tobacco use during pregnancy
10	37+2	38+4	NAS
11	30+2	33+2	Prematurity, apnea of prematurity, breech
			presentation
12	38+6	41+2	NAS
13	34+1	36+0	Prematurity, polycythemia, breech presentation
14	28+2	35+4	Prematurity, apnea of prematurity, maternal
			substance abuse (alcohol and marijuana)

15	38+0	39+2	RDS, RF
16	34+5	36+2	Prematurity, IDM, LGA
17	28+6	37+5	Prematurity, apnea of prematurity, chronic lung disease, anemia of prematurity, two-vessel umbilical cord, hydronephrosis of left kidney, left eye hemorrhage, retinopathy of prematurity
18	37+5	37+6	Hypoglycemia, IUGR
19	37+1	39+3	Feeding disturbance, reflux
20	33+0	35+6	Prematurity

Note: RF=respiratory failure, RDS=respiratory distress syndrome, HTN=hypertension,

IDM=infant of diabetic mother, IUGR=intrauterine growth restriction, NAS=neonatal abstinence syndrome, LGA= large for gestational age

OCCUPATIONAL THERAPY AND HEAD ORIENTATION PREFERENCE



WHY DOES MY INFANT ALWAYS LOOK THE SAME DIRECTION?

When your infant is positioned on his or her back, it may be hard to hold his or her head in the middle. You may see your infant turning his or her head and looking to one direction. Premature infants are at a higher risk for getting head preferences. Preferences may also be caused by:

- Positioning in the womb
- The extra-uterine environment (holding on same side, completing care on same side of crib, bed in inclined position, laying in car seats, swings and other equipment)
- Medical treatments, such as a ventilator or IV line in the scalp
- Developmental factors, such as immature neuromotor systems and weak neck muscles

Several developmental skills rely on the middle position of the head:

- Reflex patterns infants are born with developmental patterns that are needed for survival (root, suck, grasp, or startle)
- Muscle tone amount of tension in infant's muscles at rest
 - Hypotonia not enough tension, or "floppy"
- Hypertonia too much tension, or "stiff"
- Ideal is somewhere in the middle
- Visual orientation awareness and attention to objects in the environment
- Social interaction the way your infant listens, looks, and responds to you and other people
- If left unaddressed, severe head preferences may lead to:
- Torticollis
 - Shortening or contracture of neck muscles
- Plagiocephaly
 - Flattening of one side of the head, due to pressure on one area for a long time
- May delay meeting developmental milestones

WHAT CAN I DO ABOUT IT?

These ideas can be used while your infant is still in the NICU, but you should also keep these in mind upon discharge.

- Vary positions in which you feed, hold or play with your infant
- Alternate side of crib in which you complete care
- Promote participation in tummy time, only when infant is awake and supervised. This protects the airway and decreases the risk of sudden infant death syndrome (SIDS).
 - Early tummy time can involve placing your infant on your chest while you are in a semi-reclined position to allow them to begin to work against gravity
- Progress to a firm, flat surface
- May use a Boppy pillow or blanket roll under the infant's arms for support
- More information on tummy time can be found by visiting:
 - https://pathways.org/topics-of-development/tummytime-2/
- https://www.aota.org/-/media/Corporate/Files/ AboutOT/consumers/Youth/Tummy-Time-tip-sheet.pdf

Adjusting the infant's environment is another way to address head preference and promote ideal development.

- Alternate direction of the head of the bed
- Limit time spent in car seats, swings, and other equipment
- Use your voice or face to direct your infant's attention to both sides
- As your infant's visual system matures, you may consider use of pictures, baby safe mirrors, rattles, mobiles, or other toys to encourage your infant to attend to both sides

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Educational handout. This figure illustrates the bi-fold handout used to educate parents and caregivers about head orientation

preference during the implementation phase.

Appendix D

Infant Head Turn Preference Scale Post-Implementation Survey

Date:					
Department:	-				
	Least				Most
How comfortable do you feel implementing the Infant Head Turn Preference Scale to measure head orientation preference?	1	2	3	4	5
How likely are you to use this tool on a regular basis?	1	2	3	4	5
Do you feel you have adequate written/visual resources to support your education to parents regarding head orientation preferences?	1	2	3	4	5

What do you like about the assessment tool? What do you dislike?

Do you feel anything could have been done to better prepare you to administer the assessment tool?

Other feedback or questions:

Thank you for your time!

Post-Implementation Survey. This figure illustrates the post-implementation survey administered

to four neonatal therapists.