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School of Occupational Therapy

Creating a Therapeutic Positioning and Handling Program in the Neonatal Intensive Care Unit

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A capstone project submitted in partial fulfillment for the requirements of the Doctor of Occupational Therapy degree from the University of Indianapolis, School of Occupational Therapy.

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Creating a Therapeutic Positioning and Handling Program in the Neonatal Intensive Care Unit

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Section I: Abstract

The Doctoral Capstone Experience (DCE) is a 14-week long clinical rotation in which students are encouraged to gain advanced clinical skills and experience with program development. The primary focus of this reviewed clinical rotation was program development and education, with a secondary focus of advanced clinical skills. The goal of this program development was to implement an educational program to promote appropriate positioning in the Neonatal Intensive Care Unit (NICU) at IU Health Bloomington Hospital in order to prevent postural and head deformities. The student created an educational resource on positioning and therapy roles in the NICU based off of themes discovered through a needs assessment. The student also created educational tools on the Infant Positioning Assessment Tool (IPAT) in order to implement the tool as a way to standardize positioning interventions. Additional efforts were made to ensure sustainability for this program such as: a therapy plan at bedside to improve follow through on therapy recommendations, a grant letter for a new safe sleep positioning device, and clearly stated safe sleep protocol for positioning device use in an open crib. Throughout the DCE, the student noted improved staff awareness and knowledge of positioning device use and IPAT scores. Additionally, the site mentor and student noted a decrease in head deformities in infants in open cribs. The site mentor will continue this program development following the student's time in the NICU.

Creating a Therapeutic Positioning Program in the Neonatal Intensive Care Unit

The Doctoral Capstone Experience (DCE) is a 14-week clinical rotation that gives the student an opportunity to gain clinical experience and explore specific practice settings through two predetermined foci. The primary focus of this DCE is program development and education of staff members in the Neonatal Intensive Care Unit (NICU). The secondary focus of this DCE is to gain advanced clinical skills in a NICU setting including feeding, manual therapy, and developmental positioning.

Therapeutic positioning, also referred to as developmental or supportive positioning, has many goals (Altimier & Philips, 2016; Fern, 2011). These goals cover a wide variety of topics such as promotion of sleep (Fern, 2011), neurodevelopment (Altimier & Philips, 2016; Fern, 2011), normalizing infant tone (Fern, 2011), and providing infants with boundaries to promote the acquisition of age appropriate motor skills (Fern, 2011). However, therapeutic positioning is not a standardized treatment and is hard to maintain across multiple disciplines (Altimier & Philips, 2016; Coughlin, Lohman & Gibbins, 2010). Therefore, the aim of this quality improvement project is to implement an educational program to promote appropriate infant positioning in the NICU.

Section II: Background Information and Literature Review

Therapeutic positioning is an important part of occupational therapy's (OT) role in the NICU (Altimier & Philips, 2016; Fern, 2011). Therapists use their knowledge of gestational age and developmental milestones to appropriately position infants and provide the needed support to meet the goals of therapeutic positioning outlined above (Altimier & Philips, 2016; Fern, 2011; Sweeny & Gutierrez, 2002). To be positioned appropriately, infants should be placed in midline

with his or her hands touching the face, shoulders slightly rounded, with the hips, knees, ankles and feet aligned and flexed. (Masri, Ibrahim, Badin, Khalil, & Charafeddine, 2017). This position encourages development of a normal flexor tone and acquisition of age appropriate developmental skills (Fern, 2011).

Impact of Positioning on Development

Infants born prematurely face a wide variety of challenges including thermoregulation, sensory processing and stimulation, and a lack of neuromotor development, which leads to difficulty maintaining proper positioning at midline (Case-Smith & O'Brien, 2015). Without positioning aids or intervention, infants present with postural deformities, abnormal patterns of movement, delayed or abnormal motor development, and feeding difficulties (Fern, 2011). Some common conditions associated with poor positioning include head flattening such as: scaphocephaly, brachycephaly, and plagiocephaly, Torticollis, and Foot Drop (Fern, 2011; Sweeny & Gutierrez, 2002). As the infants mature, these side effects and conditions often interfere with development of reflexes, strength and muscle tone, bone density, and sleep patterns (Altimier & Philips, 2016; Fern, 2011).

Therapeutic positioning of infants in the NICU has been shown to positively influence posture and motor function (Aucott, Donohue, Atkins, & Allen, 2002: Bakhshi, Montaseri, Edraki, Nejad, & Haghpanah, 2018; Fern, 2011; Sweeny & Gutierrez, 2002). Additionally, therapeutic positioning influences thermal regulation, neuromotor and musculoskeletal development, skin integrity, stability, and facilitates sleeping patterns (Altimier & Philips, 2016). Positioning and handling also address the Neonatal Integrative Developmental Care Model's (IDC) core measure of minimizing stress and pain. Infants who are appropriately positioned are

more likely to appear calm, and show decreased stress signs (Altimier & Philips, 2016; Fern, 2011).

Positioning Interventions

Developmental positioning of infants is a therapeutic intervention used by health care professionals to achieve the previously mentioned goals with the use of positioners (Case-Smith & O'Brien, 2015). Several different positioning devices exist for utilization in the NICU. Positioners such as the Dandle Wrap ™, Dandle Roo™, Dandle Roo Lite™, Z-Flo™, and the Snuggle Up™ provide multiple benefits (Fern, 2011; Sathish et al., 2017). These positioners provide assistance with postural stability and thermoregulation, provide proprioceptive input, and help maintain a flexed midline position to promote flexor muscle development (Fern, 2011; Sathish et al., 2017). The Dandy Roo™ and Dandy Roo Lite ™ also provide protection from harsh visual stimuli such as light (Fern, 2011). Additional positioning aids such as those in the Bendy Bumpers™ family provide the infant with flexible boundaries to maintain positioning in supine, prone, and side lying. To prevent head flattening and maintain skin integrity, tools such as the Frederick T. Frog™, the Tortle (McCarty et al., 2018), and gel pillows are used to elevate the head and maintain appropriate midline head position (Fern, 2011).

Implications in Occupational Therapy Practice

Therapeutic positioning, though used by those with specialized training, is not a standardized intervention (Altimier & Philips, 2016; Coughlin, Lohman & Gibbins, 2010; Masri et al., 2017). Infants in the NICU are handled an average of eight times a day by NICU staff, requiring repositioning following routine care (Masri et al., 2017). To ensure proper positioning across the multiple disciplines, several NICU's have implemented staff training programs using

formal education, interactive workshops using computers, and bed side training (Altimier, Kenner &Damus, 2015; Masri et al., 2017; Spilker, Hill, & Rosenblum, 2016). The Infant Positioning Assessment Tool (IPAT) is an assessment tool that can be used by multiple disciplines to achieve consistent, appropriate positioning of infants (Masri et al., 2017; Spiker, Hall & Rosenblum, 2016). The IPAT provides a standardized evaluation of the infant's head, neck, hips, hands, shoulders and knees, ankles and feet (Coughlin et al., 2010) (Appendix A). Altimier et al. (2017) demonstrated that comprehensive staff straining increased consistent neuroprotective care along with improved IPAT scores and decreased time spent in the NICU. However, there is still a need for standardized positioning protocols and care (Garcia Santos, Silveira Viera, Gonçalves De Oliveira, Scalabrin Barreto, & Deggau Hegeto De Souza, 2018).

One of the main roles of occupational therapy in the NICU setting is positioning (Case-Smith & O'Brien, 2015). By addressing positioning, occupational therapists encourage improved performance in the infant's occupations of feeding, rest, and sleep participation (AOTA, 2014). They also aim to improve client factors such as muscle tone, joint stability, vestibular functions, and respiratory functions by decreasing stress signs, and providing proprioceptive input (AOTA, 2014). Nightlinger (2011), describes occupational therapy's role in the NICU as one that includes evaluation, treatment, education, and discharge planning, where education includes both NICU staff and family members. This can be achieved by providing education to staff members in the NICU on appropriate positioning (Altimier et al., 2017; Masri et al., 2017).

Theoretical Background

Developmental Care is a philosophic approach to infant care in the NICU (Altimier & Philips, 2016). It includes the traditional medical model as well as social and physical aspects of

the NICU environment (Peters, 1999). The overall goal of developmental care is to regulate the infant's response to care by providing appropriate handling and positioning techniques (Peters, 1999). This overall goal aligns with the Lifespan Development Frame of Reference (FOR). The Lifespan Development FOR's focus is to promote age appropriate skills and occupations (Cole & Tufano, 2008). Through this FOR therapeutic intervention remains client centered and be lead by the client's life stage (Cole &Tufano, 2008). Additionally, the IDC model was developed to provide NICU staff members with guidelines to care for infants and their family/caregivers (Altimier & Philips, 2016). The IDC includes seven core measures including: healing environment, partnering with families, positioning and handling, safeguarding sleep, minimizing stress and pain, protecting skin, and optimizing nutrition (Altimier & Damus, 2015; Altimier & Philips, 2016). The goal of the Lifespan Development FOR can be obtained by addressing the seven core measures of the IDC. For the purpose of this project, the focus will remain on the third core measure: positioning and handling. The student chose to utilize both the Lifespan FOR and the IDC model to guide program development due to their alignment with goals and objectives.

Section III: Screening and Evaluations

Creation of Needs Assessment

To determine the contents of the final resource, a needs assessment was created to identify positioning needs within the NICU in the form of a questionnaire (Appendix B). Evidence found throughout the literature review and informal meetings with staff guided this process. Throughout the informal interviews conducted in the first several weeks, concerns about appropriate device use and clinical reasoning for choosing a device, were common amongst

nursing staff. This reflected research that identified a lack of standardized positioning intervention across disciplines in the NICU (Altimier & Philips, 2016; Masri et al., 2017). Previous studies focused on education of NICU staff on specific standardized assessments such as the IPAT, to improve consistent positioning amongst disciplines (Masri et al., 2017; Spiker, Hall & Rosenblum, 2016). For these reasons, the IPAT is included in the resource, and therefore explored through the needs assessment.

Administration

Two content experts reviewed the needs assessment and provided feedback prior to administration to nursing staff in the NICU. Management introduced the questionnaire during daily rounds, but participation was not mandatory. Staff had 21 days to complete the survey, which was available to them throughout their shift. The questionnaire consisted of both multiple choice and open-ended questions with the option to leave comments and/or questions at the end. Questions prompted staff to rate their comfort level and understanding of developmental positioning, and positioning devices.

Results of Needs Assessment

Of the 20 questionnaires administered, 12 were completed and returned. On average, staff reported 8.32 years of experience in their profession, and 5.36 years experience in the NICU setting. Common themes found across needs assessment responses included: how nurses chose to position infants (Table 1), positioning devices used (Table 2), and a need for more education (Table 3). When asked to rate their knowledge of ‘developmental positioning’ on a scale of 1(no understanding) to 10 (complete understanding), 25 % (n = 3) reported that they had a full understanding. Additionally, only 25 % (n = 3) of staff reported being ‘very comfortable’ when

asked to rate their comfort level when utilizing developmental positioning on a scale of 1(not comfortable) to 10 (very comfortable). When asked about their familiarity with the IPAT, only 8.33% (n = 1) of staff reported that they were familiar with the positioning assessment. The student provided staff with an opportunity to express comments or questions regarding positioning and/or the project. One staff member reported "I'd like to know how what we do in the NICU affects the babies later on (positive and negative)", while another expressed their concern with device availability stating, "the availability of devices is really hit or miss".

Table 1

Needs Assessment Results: Current Positioning Process (n = 12)

Current Positioning Process	*n*	%
Gestational age	6	50%
Patient acuity	6	50%
Infant weight	2	16.67%
Previous positioning	2	16.67%
NAS	2	16.67%

Table 2

Needs Assessment Results: Positioners Typically Used (n =12)

Positioners Typically Used	*n*	%
Bendy Bumpers™	7	58.33 %,
Dandle Roo™	7	58.33 %,
Fredrick T. Frog™	7	58.33 %,
Snuggle Up™	6	50%

Table 3

Needs Assessment Results: Positioners Staff are Uncomfortable Using (n = 12)

Positioners Staff are Uncomfortable Using	*n*	%
Gel Pillow	2	16.67%
Z-Flow™ Mattress	1	8.33%

Compare and Contrast in Other Settings

Occupational therapy is utilized in a wide variety of practice settings including: schools, clinics, hospitals, homes, and communities. Services in these settings can be delivered through a direct model that involves intervention with the individual/s, or an indirect model that includes consultation (AOTA, 2014). Due to a wide variety of settings and potential client needs, the screening and evaluation process can differ greatly. In a more direct service delivery model the therapist might chose to administer more standardized assessments to identify functional deficits and impaired client factors. For example, a therapist might utilize the IPAT to score an infant's positioning during regular treatment sessions (Coughlin et al., 2010). An indirect service delivery model, which guided the majority of this program development and previous staff educational programs (Altimier, Kenner &Damus, 2015; Masri et al., 2017; Spilker, Hill & Rosenblum, 2016), might include non-standardized needs assessments and informal interviews to determine areas of need within the facility. Additionally, the definition of 'client' for the various settings will differ. In a direct service delivery model, such as treating patients in an adult outpatient clinic, the term 'client' applies to the individual receiving services. For this program development, the term 'client' is inclusive of the hospital staff, parents, and infants in the NICU.

While there are many differences across practice settings and service delivery models, there are also similarities. The purpose of providing occupational therapy services remains the same across practice settings and service delivery models: to improve participation and performance in daily occupations (AOTA, 2014). Additionally, observation and clinical reasoning are utilized in all settings to identify areas that need improvement and barriers that the client might encounter. For this program development, the student utilized both observation and

clinical reasoning while shadowing staff during infant care in order to identify any 'problem areas' that were not addressed by the formal needs assessment.

Section IV: Implementation Phase

Interventions Provided

Positioning resource. From the needs assessment, the student identified several topics that needed to be addressed through a staff resource on developmental positioning. These included: roles of physical therapy, speech therapy and occupational therapy in the NICU setting, detailed explanation and reference for developmental positioning, information on utilizing the IPAT to standardize positioning across disciplines, and detailed information and instruction on the use of various positioning devices (Appendix C).

To ensure proper use of positioning devices, handouts were created for each device used in the NICU. These handouts, which were kept in the resource binder for reference, included: name of the device, important tips for how to use the device, precautions of things to avoid/be aware of when using that particular device, and how this device promotes the infant's development. A photograph of the devices being properly utilized was also included to provide a visual reference for staff. Several copies of the resource were provided in order to increase accessibility for staff members. Additionally, the student created laminated cards that were placed on the positioning device bins that provided staff with information about when the device was appropriate and how to use it.

IPAT implementation. Throughout the process of creating the resource, the student collaborated with the site mentor, the manager of the clinic, and the director of the NICU to determine the best way to educate staff members on the use of the IPAT. Because March is

Developmental Care Month, the student created a poster to display in the NICU break room (Appendix D). This poster contained information on developmental positioning including: goals of developmental positioning, how an infant should be positioned, and a picture of the Neonatal Integrative Developmental Care Model. Following the needs assessment results and the finalized resource, the poster also described the positive impacts of appropriate positioning and the negative impacts of poor positioning on an infant's development. In order to increase knowledge and utilization of the IPAT, the majority of the poster outlined the steps to complete the assessment, how to score an infant's positioning, and when to reposition an infant based off of score. Additionally, the student began administering the IPAT during routine care as a way to introduce the IPAT and educate staff through example. Staff members were provided an opportunity to leave comments or questions for the student and site mentor regarding poster content.

Therapy plans in the NICU. As the implementation phase of the program development progressed, the student met routinely with therapy staff to discuss NICU issues. One of these issues was a lack of follow through of therapy recommendations by NICU staff members. Previously, each infant bedside included a laminated sheet of paper that therapy staff could write special recommendations for feeding, positioning, and exercises. Unfortunately, the papers were often lost when moving infants to different beds or buried under other paperwork. To address this, the student collaborated with the speech and physical therapist at the clinic to create a therapy plan that could easily be used by all NICU staff (Appendix E). This plan included feeding recommendations (position, time limit, nipple size, and pacing), a positioning order to keep track of an infant's previous positioning, positioning device inventory, oral motor exercises,

and sensory interventions. It was designed in order to allow the therapy staff to circle or write in recommendations for the infant, in a clear and concise way to reduce confusion. The NICU director approved the therapy plan and plans were made to create whiteboards that will be posted at each bedside to prevent the therapy plan from becoming lost.

Safe sleep protocol. Another issue was a lack of consistency with positioning device use during safe sleep and open crib use. The student collaborated with the site mentor and the NICU physicians to create a handout and protocol for safe sleep and use of boundaries (Appendix F). This protocol allows infants over 36 weeks gestation to receive additional support from boundaries based on their IPAT score, and promotes positioning interventions to prevent head deformities. This protocol also includes rules for educating parents on the additional use of devices in the hospital and safe sleep practices at home. In order to prepare the infant and parents for discharge, all positioning devices will be removed at the beginning of the countdown.

Nursing Competency. In order to ensure staff understanding and follow through of the positioning program, a competency was created (Appendix H). This competency is structured in the form of a short quiz and includes questions regarding: therapy roles in the NICU, the IPAT, safe sleep protocol, and results of poor positioning. Nurses will be asked to complete this competency following a developmental fair where they will have time to explore the resources in depth.

Building supplies. Another need that was identified throughout the needs assessment and informal interviews with staff was a lack of resources. To address this need, the student took multiple steps and collaborated with the site mentor and other NICU therapists to advocate for the purchase of additional positioning supplies. The student took inventory of positioning

devices and supplies being used by infants and in those in storage to determine what would be appropriate to order. Supplies that were identified as low inventory included small Bendy Bumpers™, gel pillows and Fredrick T. Frogs™. Additionally, the inventory of covers for the positioning devices was lacking**.** Through the interviews and routine interaction with staff, the student and site mentor learned that many of the reusable supplies such as gel pillows and device covers, were being discarded due to lack of knowledge about product use. To increase knowledge about reusable products, the student included information on proper sanitation procedures on the specific device handout (Appendix H).

In addition to taking inventory, the student conducted literature searches to gather information on the Shape Right positioning system to provide an alternative to traditional positioning methods (The Shape Right System, 2018). The NICU has received a sample positioner and accessories from the Shape Right Company. The student and site mentor plan to interview nursing staff about questions and concerns with the new system and help the NICU director to decide if it would be beneficial to purchase for regular use.

Leadership

The student demonstrated leadership skills at various times throughout the experience including: receiving/giving feedback, staying motivated, communication, creativity, and flexibility. Throughout the experience the student sought out feedback and input from other therapists working in the NICU on the resource in order to ensure that all disciplines were accurately represented. Additionally, the student provided feedback on the implementation and education of the IPAT and how to express pre and post education scores. The student experienced several barriers during the implementation phase such as: inconsistent

communication and availability of the NICU director, a lack of funding for new positioning devices, and resistance to change. To overcome these barriers, the student was flexible with project implementation and the time line in order to best integrate the resource and IPAT into the NICU. The student also displayed leadership through creativity to write and assemble a poster that could be used to introduce the new resource to nursing staff. Finally, the student demonstrated leadership through open and frequent communication with the site mentor, and members of other disciplines to complete the implementation process.

Staff Development

The main purpose of this project was to increase the quality of positioning in the NICU by educating staff members on appropriate developmental positioning devices and procedures. The student promoted staff development in several ways including: creation of developmental positioning resource and poster, education on developmental positioning and IPAT administration, and educating staff on importance and roles of therapy disciplines in the NICU. Throughout the implementation phase, NICU staff expressed and demonstrated an increase in knowledge regarding developmental positioning and use of positioning devices.

Section V: Discontinuation and Outcomes

Sustainability

In order to ensure sustainability of the developmental positioning program, the therapists working in the NICU are now documenting IPAT scores prior to, and following therapeutic intervention. Therapeutic intervention typically coincides with the infant's routine assessment and care provided by nursing staff, which allows therapy staff to continuously educate and provide the nurses with feedback on positioning. It also provides nursing staff the opportunity to

ask questions about administering the IPAT and use of positioning devices. Additionally, the student and therapy staff are advocating for the IPAT to be included in the template for nursing staff documentation. This will encourage continued use of the IPAT when therapy staff is not present. The director of the NICU also set a date for a developmental fair which will allow nursing staff to further discuss their positing device questions and make requests for new positioners. New positioning devices will be ordered based off of results from the student's needs assessment and nursing staff report.

The student also collaborated with the physical and speech therapist at the clinic to promote sustainability. The physical therapist plans to monitor infant head shape on a routine basis in order to prevent head deformities, which will be logged on the therapy plan. Additionally, all three disciplines plan to utilize the therapy plan at bedside to promote follow through on therapy recommendations for feeding and positioning. The therapy plan includes a list of positioners to be used with each infant, which will help to guide nursing staff with positioning when therapy team is not present.

As previously stated, the student created a safe sleep positioning protocol that will provide nursing staff with set guidelines for positioning device use in open cribs. In order to make the protocol sustainable and easily integrated into routine care it will be used in conjunction with the therapy plan at bedside.

Meeting a Societal Need

The student met the societal need for a consistent positioning protocol and developmental care for NICU infants throughout the entirety of the DCE experience. Without positioning aids or intervention, infants present with postural deformities, abnormal patterns of movement,

delayed or abnormal motor development and feeding difficulties (Fern, 2011). As previously mentioned, there are several conditions that can result from poor positioning (Fern, 2011; Sweeny & Gutierrez, 2002). As infants mature, these conditions often interfere with development of reflexes, strength and muscle tone, bone density, and sleep patterns (Altimier & Philips, 2016; Fern, 2011). These long-lasting side effects can cause the infant and family to experience a high amount of stress due to the time, money, and resources needed to manage and treat those conditions. By creating a positioning program, the student hoped to decrease postural and head deformities while promoting appropriate tone. This would prevent or decrease the need for outpatient therapy, and the emotional and financial strain on families.

To determine the effectiveness of the positioning program and additional resources, the student re-administered the needs assessment to nursing staff. Collection of the re-assessment took place over the course of one week. Of the 15 assessments administered, five nurses responded. If should be noted that the decrease in response rate could be explained by a decreased time for completion of the assessment. Overall, the respondents reported an increased knowledge and comfort level with the various therapy roles in the NICU and developmental positioning. The majority of nurses also reported familiarity with the IPAT and reported a comfort level of 8 or above (1 ‘not comfortable’ and 10 being ‘very comfortable’) (n = 4). None of the respondents reported feeling unsure of positioning device use. Additionally, when asked to leave questions or comments for the student, one respondent stated “I feel much more comfortable using our positioners”. The same respondent also stated, “Thanks for this, I learned a lot”.

Section VI: Overall Learning

Communication

Communication was at the forefront of program development and collaboration throughout the DCE. The student demonstrated effective communication with the client, colleagues and other healthcare providers. For this DCE the 'client' included the entire NICU staff as well as the outpatient clinic manager. When communicating with the client, the student had open communication with nurses, doctors, and other NICU therapists. Open mindedness, understanding, and flexibility were required when communicating with healthcare professionals who have unpredictable schedules and have countless responsibilities. To make sure the communication process was most convenient for them, the student took initiative to seek them out and make needs, questions, and idea proposals quick and concise. Correspondence took the form of emails and phone calls when an in person meeting was not possible. Additionally, while educating nurses it was important to remember to approach the idea of education and teaching as a service instead of a requirement. In order to build rapport and increase effectiveness of the program, the student chose to communicate new program guidelines and protocols through example rather than a written competency or checklist. When providing feedback on poor positioning, the student made sure that her body language communicated openness for comments or questions while also focusing on things they had done correctly.

When communicating with families, the student made sure to use the appropriate language while educating families on positioning techniques before and after discharge. In addition to positioning in the crib, the student and site mentor provided families with positioning advice during feeding and tummy time. The student made an effort to demonstrate the same openness when interacting with families as with colleagues. When parents were not present

during therapy sessions, the student and site mentor left special notes for the parents describing things they could do to help an infant's positioning when they are at the hospital.

Finally, the student demonstrated professional communication skills when interacting with the NICU community and public. Throughout the DCE, the site mentor and student reached out to other NICU therapists in and outside of the hospital network to collaborate and gain feedback on the positioning resource and the safe sleep protocol. These communications mostly occurred through email, but still provided the student with valuable information and suggestions for the program development. Additionally, the student drafted a grant proposal to be used at the NICU's discretion that details the significance of the new positioning program and the importance of having the funds for new positioning devices.

Leadership and Advocacy

As previously mentioned, the student demonstrated several various aspects of leadership throughout the DCE experience. The most observable example of leadership is the introduction and implementation of the IPAT in the NICU. This task required the student to be flexible when interacting with other healthcare professionals and to be open to suggestions from more experienced staff members. It also required the student to show creativity and initiative to come up with effective ways to introduce new educational material to staff while maintaining rapport with the nurses.

While working to implement a new positioning program and address items found through a needs assessment, the student was also able to advocate for the OT profession in several aspects. Firstly, many of the nurses who completed the needs assessment were unsure of the role that occupational therapists played in the NICU setting. To address this need, a diagram of the

various roles of speech, physical and occupational therapy was included in the positioning resource. This, along with the student's interaction with nurses at the infant's bedside, led to more questions regarding the OT profession, and positioning interventions. Advocacy also occurred through the program development goal of promoting appropriate positioning and acquisition of age appropriate developmental skills. The student advocated for the improved developmental care of infants throughout the entirety of the DCE through means of literature searches, creation of resources and protocols, education of staff, and advocating for additional positioning devices.

Conclusion

Throughout this program development, the student gained professional skills including: flexibility, communication, initiative, creativity, and problem solving throughout the course of the DCE. The student successfully created a developmental positioning program and educated nursing staff on the importance of utilizing positioning to improve neonatal infant outcomes. The student observed improvement in IPAT scores, positioning device use, head shape, and knowledge of occupational therapy's role in the NICU throughout the course of the 14-week experience. Continuation of the program by NICU therapists and the site mentor will ensure long term sustainability which, in turn, should lead to a long-lasting effect on infant care.

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Appendix A
Infant Positioning Assessment Tool (IPAT)

IPAT

Infant Position Assessment Tool

Introduction

The Infant Position Assessment Tool (IPAT) is a six-item tool with cumulative scores ranging from 0 to 12. It was developed as a teaching tool to standardize developmentally supportive positioning practices in the NICU and provides a method for evaluation of those positioning practices. Content validity of the IPAT is based on research evidence and opinions from both clinical experts and researchers in developmental care.

How to use the tool (A, B, Cs)

A) The new user can review the various body part indicators and view least favorable to most favorable infant positions across each body part domain.

B) Once this baseline information is assimilated by the clinician s/he is ready to provide consistent developmentally supportive positioning. Using the tool as a reference, the clinician can position the infant optimally to promote musculo-skeletal development, comfort and sleep.

C) The tool is also used to assess the infant's position and repositioning needs prior to engaging in a caregiving interaction. Spontaneous movement is a natural phenomenon for infants; however, in the absence of therapeutic positioning supports, these spontaneous movements may leave the infant 'stranded' in a suboptimal position. Completing an IPAT with each caregiving exchange enables the developmentally supportive clinician to identify infant movements that may benefit from positioning supports as well as ensure that the infant is repositioned appropriately to promote comfort, sleep and musculoskeletal development.

IPAT scores

An optimal IPAT score ranges between 10 to 12 points. There are several circumstances that may impede your ability to provide that degree of optimal positioning (e.g., infants with various venous or arterial access needs, drains, surgical sites, etc.), which is why it is so important to document the variance in your ability to provide optimal positioning for each infant.

In general, scores less than 8 indicate that the infant is in need of positioning support that offers containment, promotes flexion and ensures proper body alignment.

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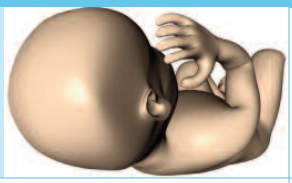
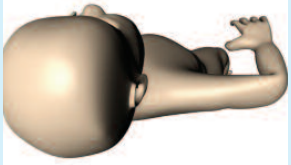
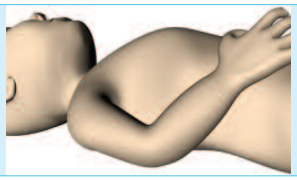
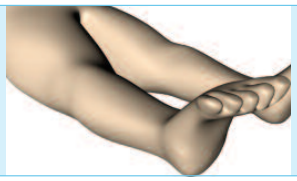
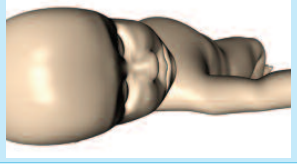
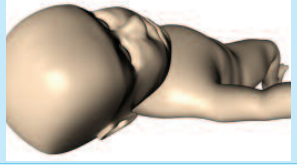
PHILIPS
Children's Medical Ventures

IPAT

Infant Position Assessment Tool

Patient's name: _____ Corrected gestational age: _____

Clinician's name: _____ Date/time of assessment: _____

Indicator	0	1	2	Score
Shoulders				
	Shoulders retracted	Shoulders flat/in neutral	Shoulders softly rounded	
Hands				
	Hands away from the body	Hands touching torso	Hands touching face	
Hips				
	Hips abducted, externally rotated	Hips extended	Hips aligned and softly flexed	
Knees, ankles, feet				
	Knees extended, ankles and feet externally rotated	Knees, ankles, feet extended	Knees, ankles, feet are aligned and softly flexed	
Head				
	Rotated laterally (L or R) greater than 45° from midline	Rotated laterally (L or R) 45° from midline	Positioned midline to less than 45° from midline (L or R)	
Neck				
	Neck hyperextended, flexed	Neck neutral	Neck neutral, head slightly flexed forward 10°	
Ideal cumulative score = 10-12			**Total score**	

Appendix B

Positioning of Infants in the NICU

Needs Assessment

Please state the following

Number of Years in your profession: _____Number of years experience in NICU setting_____

1. How would you rate your understanding of developmental positioning?

No understanding 1 2 3 4 5 6 7 8 9 10 Full understanding

2. How comfortable are you with the developmental positioning of infants?

Not comfortable 1 2 3 4 5 6 7 8 9 10 Very Comfortable

3. How would you rate your understanding of the negative impacts of poor positioning?

No understanding 1 2 3 4 5 6 7 8 9 10 Full understanding

4. How would you rate your understanding of the positive impacts of developmental positioning?

No understanding 1 2 3 4 5 6 7 8 9 10 Full understanding

5. How would you rate your understanding of positioning tools and devices (i.e. Frogs, gel pillows, etc.)?

No understanding 1 2 3 4 5 6 7 8 9 10 Full understanding

6. Are you familiar with the Infant Positioning Assessment Tool (IPAT)? Circle one.

Yes No

7. If you answered yes to question 6, how would you rate your understanding of the IPAT?

No understanding 1 2 3 4 5 6 7 8 9 10 Full understanding

8. If you answered yes to question 6, how would you rate your comfort level administering the IPAT?

Not comfortable 1 2 3 4 5 6 7 8 9 10 Very Comfortable

9. How would you rate your understanding of therapy intervention in the NICU?

No understanding 1 2 3 4 5 6 7 8 9 10 Full understanding

10. How would you rate your understanding of various therapy roles in the NICU setting (i.e. Occupational, physical and speech therapies)?

No understanding 1 2 3 4 5 6 7 8 9 10 Full understanding

11. How would you rate your knowledge on *when* positioning and boundaries are needed?

No knowledge 1 2 3 4 5 6 7 8 9 10 Fully Knowledgeable

12. Please describe your current positioning process below. How do you decide when/how to position?

13. Please list the positioners you typically use when positioning infants.

14. Please list any positioners for which you are unsure of the use or uncomfortable using.

Comments or Questions:

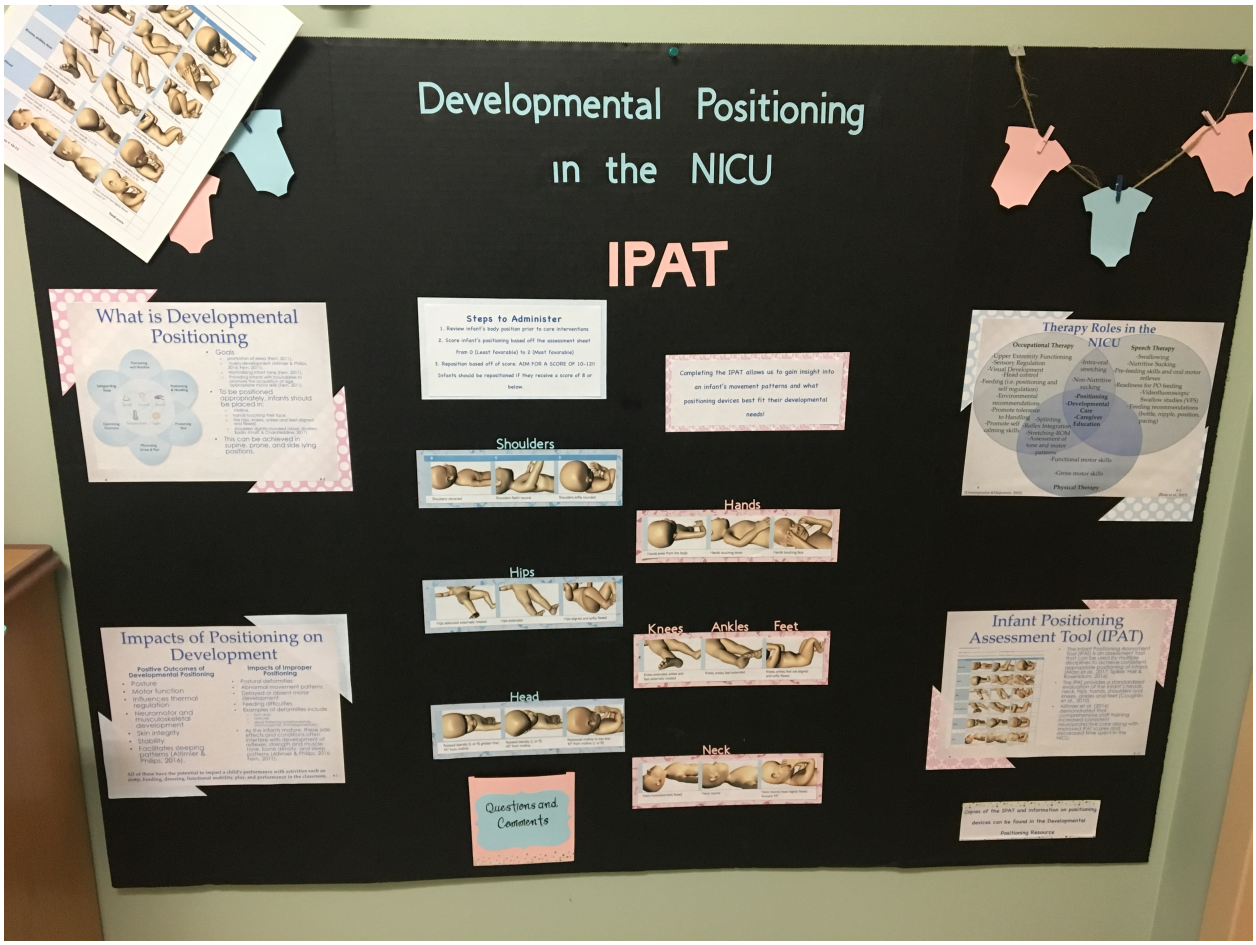
Appendix C

Resource Outline

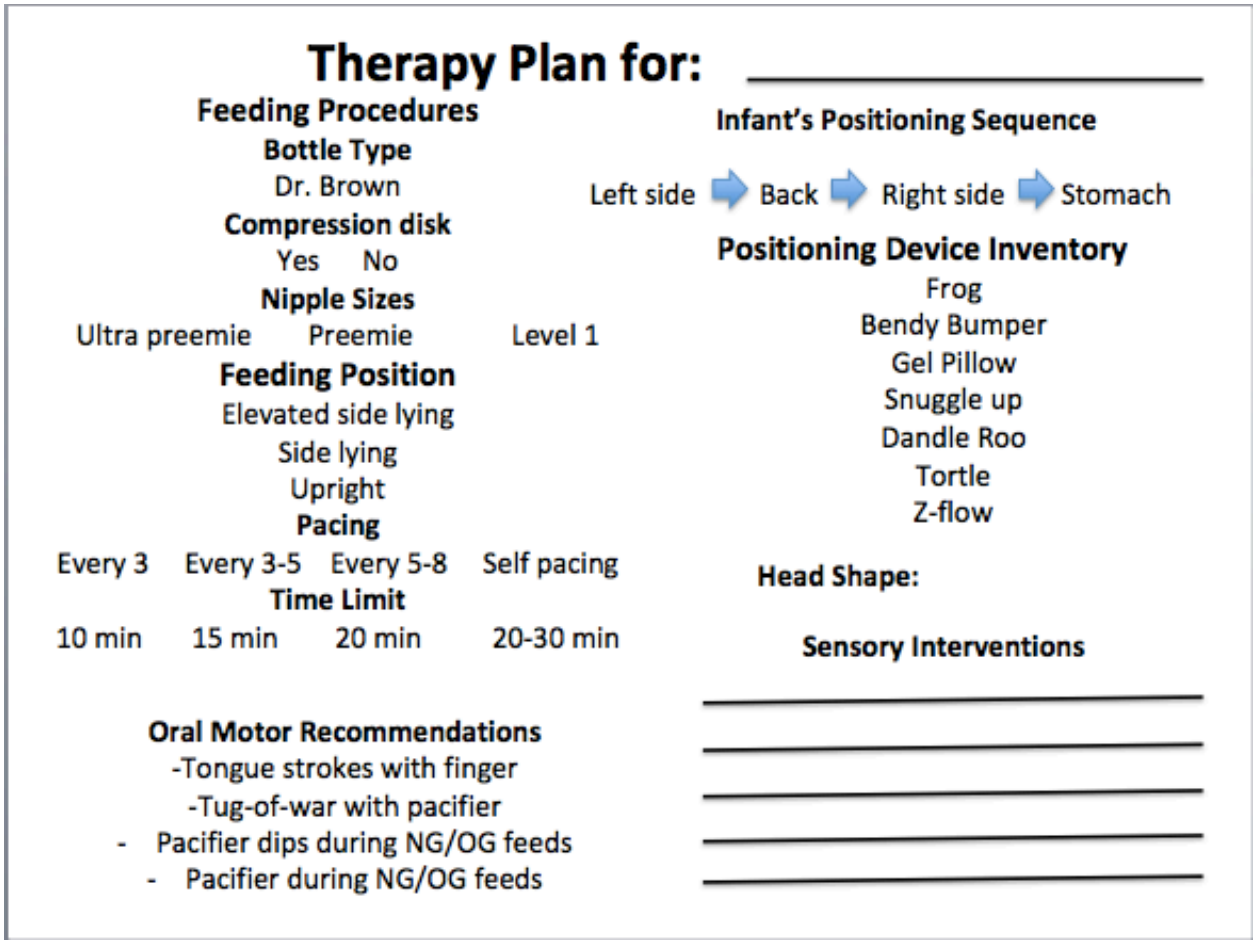
1. Role of therapy in the NICU
    a. OT, PT, SPT,
2. Description of Developmental Positioning
    a. Definition
    b. Tie in with the IDC model for NICU
3. Proper positioning
    a. What it looks like
    b. What are the positive impacts of proper positioning long term
    c. What are the negative impacts of negative positioning long term
        i. Conditions (head shape, tactile defensiveness, self regulations, deformities)
4. Use of Positioners
    a. Full body
        i. Dandle roos
        ii. Snuggle ups
        iii. Swaddle
        iv. Halo
    b. Tools
        i. Bendy bumper
        ii. Frog
        iii. Towel roll
        iv. Gel pillow
        v. Tortle
5. IPAT
    a. Administration
    b. Scoring
    c. Copy of the assessment

Appendix D

Developmental Month Poster



Appendix E
Therapy Plan for NICU Infant



Appendix F

Safe Sleep/Boundaries Protocol

- Open Crib Procedures
  - Positioning devices used in open crib for head shape and midline control
    - Tortle
      - Schedule wear time based on feeding/care schedule. 3 hours of wear and 3 hours off.
    - Gel Pillow and Frog
      - Gel Pillow and Frog used together can be used when an infant is not in the Tortle. Gel Pillow should be positioned under the head and shoulders. Legs of the Frog should be placed around top of baby's head and under sides of gel pillow to help the infant maintain midline position.
  - Bendy Bumpers SHOULD not be used in open crib
- Boundaries
  - Infant's less than 36 weeks should ALWAYS have boundaries.
  - The need for boundaries for Infants that are 36 weeks or older will be determined by their IPAT scores and head measurements in which therapy will assess and have written on therapy plan at bedside.
    - Infants who score 8 or below on the IPAT and/or have torticollis or Plagiocephaly/Scaphocephaly will require continued use of boundaries as determined by therapist and physician.
    - Positioners will be circled on therapy plan if needed or positioners will be X out if not recommended (or if there is plan for discharge within 1 week).
- Discharge
  - Infants that are expected to go home in 1 week and/or on countdown should practice safe sleep procedures
    - No positioning devices

Appendix G

Nursing Competency on Positioning and Safe Sleep Protocol

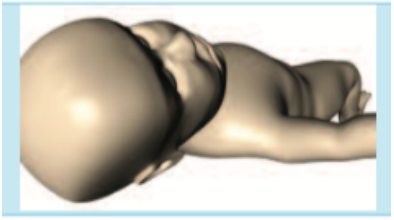
1. Please match the following therapeutic interventions to the correct discipline

Readiness for PO feeding _____	A. Physical Therapy
Sensory Regulation and Tolerance to Handling _____	B. All Disciplines
Gross Motor Skills _____	C. Speech Therapy
Positioning_____	D. Occupational Therapy

2. Which of the following would receive a score of '2' on the IPAT? Circle One.

Hips abducted, externally rotated

Neck neutral, head slightly flexed forward 10°



Rotated laterally (L or R) 45° from midline

3. According to the positioning/boundary protocol, when is the best time to take out boundaries?
    a. When an infant reaches 36 weeks gestational age
    b. If an infant scores below an '8' on the IPAT in an open crib and is not on a countdown
    c. Infant is on a countdown to discharge home
    d. All of the above

4. Why do we use positioners? Circle all that apply
    a. Promotes neuromuscular and musculoskeletal development
    b. Promotes appropriate sleep patterns
    c. To decrease proprioceptive input
    d. To decrease chance of postural and head deformities

5. Please list 2 reasons we would use a Freddy Frog to position an infant.

1_____

2_____

Appendix H

Example of Positioning Device Handout with Sanitary Instructions

Gel Pillow

- **Important tips for use**
  - Gel pillows can provide cushioning for the infant's head and can help hold the infant's head in midline (sometimes with additional help of the Frog).
  - Only use one layer (such as a gel-pillow cover) in order for the pillow to work properly.
  - Can be reinforced with the frog or towel roll to maintain position.
- **Things to Avoid**
  - Do not let the gel-pillow become too flat, or the beads to flatten. If the infant's head is on the pillow and still touching the hard surface, the pillow should be replaced.
  - Try to avoid the infant's chin to rest on its chest when using this device. Ensure that the pillow is also under shoulders to prevent aspiration.
- **How does this help the infant?**
  - **HELPS PREVENT HEAD FLATTENING** by elevating the head off of the bed.

This device and it's cover can be reused! Please place cover in mesh laundry bag by blanket cart when dirty.

Fern, 2011