8-2020

Implementing a standardized pediatric bone marrow transplant orientation.

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Implementing A Standardized Pediatric Bone Marrow Transplant Orientation

by

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Paper submitted in partial fulfillment of the
requirements for the degree of

Doctor of Nursing Practice

School of Nursing, University of Louisville

August 7, 2020

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Acknowledgements

My deepest and sincerest gratitude belongs to my husband, family, and friends. Their love, prayers, and endless support have empowered me in the difficult moments and have driven me to accomplish this dream. A special thank you to Dr. Angie Malone, project chair, who contributed support and guidance for this project.

I would also like to thank the pediatric oncology nurses, nurse educators, and managers for their unrelenting support in the development of this project. Your commitment to learning and caring for others is inspiring.

Dedication

This project is dedicated to the children who have been gravely affected by cancer as well as the nursing staff who provide care for this unique population. The strength of these children is beyond measure. The compassionate care provided to the children by the nursing staff is admirable and one-of-a-kind.

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Abstract

Nurse orientation programs focus on establishing a nurse's ability to perform skills necessary in the organization's setting. The purpose of this project was to develop a unit-specific orientation program for the experienced registered nurse transitioning into providing care for pediatric bone marrow transplant (BMT) patients at a local children's hospital to enhance nurse knowledge and satisfaction. Melnyk and Fineout-Overholt's rating system for the hierarchy of evidence was used in the selection of articles with high levels of evidence for the critical appraisal of the supporting literature for the program development. The best practices for orientation content provide constructive effects on nursing knowledge, satisfaction, and serve as evidence for the content. Bandura's Social Cognitive Theory, specifically self-efficacy, was the contributing theoretical framework for advancing the knowledge of pediatric oncology nurses who participate in the orientation program. Orientation materials were obtained and adapted as the main components for a positive orientation at the hospital. A unit-specific orientation based on evidence will provide an operational process for the experienced nurse transitioning to a specialized unit. The results of this project aided in the transition of nurses into the new environment and expected role. After implementation, this project was aimed to increase nurse knowledge and self-efficacy.

Keywords: Bone marrow transplant (BMT), nurse self-efficacy, nurse orientation, nurse development.

Implementing s Standardized Bone Marrow Transplant Orientation

Current studies show there has been a strong focus on the orientation process of novice nurses rather than nurses with previous hospital experience (Dellasega, Gabbay, Durdock, & Martinez-King, 2009). There was an identified lack of orientation for experienced nurses on the integrated hematology/oncology unit at Norton Children's Hospital for those transitioning to providing care for BMT patients. The previous orientation process entailed members of management identifying nurses with approximately one year of oncology experience and requiring them to follow a nurse who is already working in BMT. The orientation lasted approximately two weeks, equivalent to six workdays. There were no documents or guidelines for topics and skills the nurses should learn. Thus, a structured orientation program for experienced nurses transitioning to specialized units was needed.

There are an increasing number of children diagnosed with a malignant or hematologic disorder in the United States requiring a bone marrow transplant. Unlike adult cancers, pediatric cancers do not have a known cause. Pediatric cancers are not strongly linked to lifestyle or environmental risk factors and very few are caused by genetic DNA mutations (Norton Children's, 2019). A staggering 13,500 children are diagnosed with a pediatric cancer each year in the United States (American Cancer Society, 2019). This means 1 in 285 children will be diagnosed with cancer before their twentieth birthday (Norton Children's, 2019). Despite the advancements in treatment, cancer remains the leading cause of death from disease among children. Norton Children's Hospital, affiliated with the University of Louisville, is home to the Hannah Evans Bone Marrow Transplant Program, the region's only blood and marrow transplant program. It has been dedicated to helping children since 1933. Norton Children's Hospital is a member of the Pediatric Blood & Marrow Transplant Consortium, the Blood and Marrow

Transplant Clinical Trials Network, and is accredited by the Foundation for the Accreditation of Cellular Therapy (FACT) for high-quality care provided to transplant patients (Norton Children's, 2019).

More than 200 children receive care from Norton Children's Hospital each year, patients come to this institution from 71 counties in Kentucky and Southern Indiana (Norton Children's, 2019). In addition, Norton Children's (2019) reports providing approximately 8,200 chemotherapy treatments each year. Norton Children's provides the region with the latest advancements in pediatric cancer care and programs. Norton Children's (2019) is also home to Kentucky's only bone marrow transplant program specifically for children.

The Institute of Medicine (IOM) recommended the need for specific orientation programs to support the specialty nurse (IOM, 2010). With a strong push for orientation from governing bodies, The Joint Commission's (TJC) (2019) position on the goal of orientation was for the employee to demonstrate the required attribute to deliver safe, quality care. When an organization is determining competency requirements, special consideration should be given to needs of its patient population and conditions or diseases treated. Further, TJC required the nurse to have a thorough knowledge of unit routines, documentation, roles, and responsibilities of the designated position (TJC, 2019). It was deemed imperative for the BMT nurse to understand the different requirements when caring for the high acuity patient (Healthcare Education Services, 2017).

In 2010, the Association of Pediatric Hematology Oncology Nurses (APHON) released their position on the education of the pediatric hematology and oncology nurse. APHON discussed the constant state of change that is common in healthcare, requiring nurses to have a solid educational foundation on how to best care for their complex patients and how to integrate

knowledge into clinical practice (APHON, 2010). It was the position of APHON that oncology nurses complete APHON's *Foundations of Pediatric Blood and Marrow Transplantation: A Core Curriculum.* Based on these positions, healthcare institutions need to commit to educating experienced nurses in order to ensure patients receive compassionate, evidence-based, high-quality care. The position statement from APHON supported and encouraged institutions to use the most up to date available resources to continually educate specialty nurses.

A formal and standardized orientation program was found to be important to motivate employees, increase knowledge, and enhance self-efficacy (Kokkonen, Cheston, Dallas, and Smart, 2014). Through a discussion with the oncology unit management and the BMT nurse clinicians a conclusion was reached which determined a low efficacy orientation process for nurses caring for the bone marrow transplant patient. The discussion included overall perceptions of nurse self-efficacy and knowledge of the patient population. Key department leaders, educators, and clinicians were questioned on the missing components of the orientation process.

An orientation process should include generalized nursing orientation along with unit specific education (Sandau & Halm, 2010). Baseline standards for pediatric oncology nursing included the need for nurses to participate in a formalized orientation program. Published literature has been heavily focused on the novice nurse; therefore, little attention has been paid to experienced nurses who transition to new job or attain new responsibilities, such as the oncology nurse developing their role to care for BMT patients. Using Likert-type survey results after completion of a unit-specific orientation, Bashford et al. (2012) determined the need for specific orientation. Their study examined the value of competency-based orientation for nurses three months after their orientation. Overall, 50% of nurses found the orientation helpful in retaining information learned. This assessment validated the unit-specific orientation process of nurses and

contributed to an environment promoting knowledge and increased self-efficacy for nurses and quality care for patients. Studies are needed to further quantify the impact of transition in the clinical setting. A learning program was required for nurses when transitioning to a new specialty. Chung and Lai (2003) performed an exploratory study to address the informational needs of health care professionals. Chung and Lai explored the level of knowledge that health care professionals perceived themselves as having and their informational needs. It was determined 65% of participants reported having sufficient knowledge of their specialty; only 40% expressed having sufficient knowledge of how to care for patients in their specialty. Morris et al. (2009) found unit-specific orientation programs yielded a significant improvement in nursing preparedness (86%).

Quantitative research data was desired to engage senior leadership in support for implementing further education for experienced-specialized nurses. Many researchers viewed competence as a variable to categorize novice and experienced nurses. Beercroft, Kunzman, & Krozek (2001) determined orientation was imperative for highly skilled pediatric specialty nurses. The orientation would create staff nurses who were 67.3% more confident and who provided competent and safe patient care. Standardized orientations resulted in 25% increased knowledge of cancer care (Cary, 2001). Robbins (2014) determined an evidence-based approach to nursing orientation led to an average 9-point out of 10 knowledge score after intervention. Using a knowledge pretest, competence was measured by Kuokkanen et al. (2016), using the Visual Analogy Scale (VAS), where scores ranged from 0 = low to 100 = high. The mean score was 65, indicating unit-specific orientation should be used to improve mean competence. Ballard, et al. (2012) published findings used to measure the knowledge retention and orientation satisfaction of nurses hired by specialty units. Through a unit-specific orientation, researchers

found the mean knowledge, determined from pre- and post-tests, a significant increase of 20.27% over a three-month period (Ballard et al., 2012). The role of a specialized orientation program was to bridge the gap between the nurse and the newer high acuity patient population, while providing the nurse with support to improve self-efficacy (Ballard et al., 2012).

Effect on Nursing Self-Efficacy

To establish a need for specific orientation, it needed to be found as a worthy investment for employers. Nurse leaders recognized a desire to improve measurable outcomes such as nursing self-efficacy. The review of literature demonstrated a pattern of increased nursing self-efficacy with specific orientation programs. The social cognitive theory was used to measure the perceived self-efficacy of nurses' before and after training (Cheng, 2008). The perceived self-efficacy before training was 86% and after training the scores increased to 93% (Cheng, 2008). After the training the nurses had become more confident in accomplishing the goals of the job. In a study conducted by Kakkonen et al. (2014), researchers learned about the self-efficacy of nurses. Nurses with high self-efficacy had tendency to be more efficient and confident than nurses with lower self-efficacy. Duffy, Oyebode, and Allen (2009) examined the roles of self-efficacy, reciprocity, and organizational factors in burnout in 61 members of staff working in healthcare. Higher levels of self-efficacy were found to be associated with higher levels of personal accomplishment. Increasing self-efficacy for nursing practice may improve nurses' professional practice behaviors and ultimately improve the quality of patient care that nurses provide (Manojlovich, 2005). To identify the appropriate course of action and appropriately function, nurses must have an understanding and control over their job (Manojlovich, 2005), and possess the ability to do so (Bandura 1997). Without the ability to make decisions, nurses may not be able to work in a manner consistent with professional standards (Manojlovich, 2005).

Self-efficacy beliefs have been demonstrated to aid in efficient analytic thinking in complex decision-making situations (Bandura, 1989). Professional practice was related to self-efficacy ($r= 0.45$, $P< 0.01$) suggesting self-efficacy is positively related to professional practice (Manojlovich, 2005). The significant relationship is important because it provides information about the determinants of professional behaviors, which can affect patient outcomes.

Theoretical Framework

Albert Bandura's Social Cognitive Theory emphasizes how behavior, environmental factors, and the person interact to determine behavior. According to Bandura (1989), human functioning is the result of the interaction among all three of these factors as embodied in the triadic reciprocal determinism model (see Figure 1, for visualization of model) (Wood & Bandura, 1989).

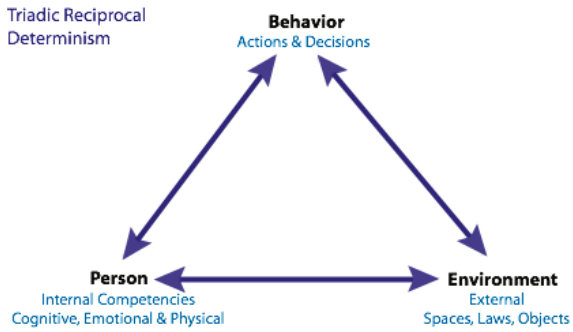

Figure 1. The Triadic Reciprocal Determinism Model

The major links between the different subsystems of influence is bidirectional, but this does not mean that the influencing factors are of equal strength, nor do they all occur concurrently (Wood & Bandura, 1989). Some may be stronger than others and some may occur simultaneously. The person (P) and behavior (B) of reciprocal causation reflects the interaction between thought, affect, and action. Expectations and beliefs affect how the person behaves (Bandura, 1986). The environment (E) to person (P) segment is concerned with the interactive relation between personal characteristics and environmental influences. Human expectations,

beliefs, and cognitive competencies are developed and modified by the social influences that activate emotional reactions (Bandura, 1986). The final segment represents behavior (B) and environment (E). In day-to-day life, behavior is changed by environmental conditions but it is also changed by the variety of conditions is creates (Bandura, 1989).

Although the social cognitive theory covers many topics, research is primarily focused on self-efficacy; the beliefs regarding one's capability to successfully complete tasks or goals. The basic principle is individuals are more likely to participate in activities for which they have high self-efficacy and less likely to engage in those they do not. According to Bandura (1977), performance outcomes are the most important source of self-efficacy. Positive and negative experiences can influence the ability of an individual to perform a given task. If an individual has had a positive experience, they are much more likely to feel competent and perform well. The individual's self-efficacy will be high in that particular area, and since he or she has a high self-efficacy, he or she is more likely to try harder and complete the task with much better results (Bandura, 1977).

Improving the orientation process of the nurse requires the design and implementation of a specialized learning environment. Overall, the goal of this project is to develop an orientation process, which enhances the knowledge and self-efficacy of the nurse. Bandura's social cognitive theory, specifically self-efficacy, has been used in nursing to make intuitive changes in how knowledge is developed and to serve as a foundation for how nurses build and improve self-efficacy. Bandura's theory can be used to bridge the gap between theory and skill; therefore, enhancing the care provided to pediatric BMT patients. The intervention for this project will include implementing a standardized orientation for the nurse starting care of the pediatric BMT patient.

Setting and Organizational Assessment

The setting for this project was the Addison Jo Blair Cancer Care Center at Norton Children's Hospital. The twenty-bed inpatient unit, The Addison Jo Blair Cancer Care Center, treats children with a variety of oncologic, hematologic, or renal diseases. The unit has a wing solely dedicated to the care of the pediatric bone marrow transplant patient.

Providing professional development training for pediatric bone marrow transplant nurses can help improve care and may be beneficial for stakeholders such as nurse managers, nurses, patients, and families. There was buy-in and support from the unit manager, nurse educator, BMT nurse clinicians, physicians, and pharmacists. Staff nurses had additionally expressed interest in developing their knowledge of the BMT patient.

The strengths of this project included buy-in from key stakeholders. Another major strength of this quality-improvement project was the determination of the self-efficacy of nurses from various levels of experience working together in the acute-care setting caring for the pediatric bone marrow transplant patient. This project was able to indicate the knowledge level of nurses and indicate the success of a standardized orientation process.

The barriers for this project were as follows. Some nurses may not have understood self-efficacy; therefore, they may not have accurately articulated their feelings of self-efficacy. Some nurses may have believed they had extensive bone marrow transplant knowledge and did not require additional classroom education. Additionally, some nurses may have believed their scores of knowledge and self-efficacy may have been shared and had a negative impact on their employment.

This project was submitted for approval by the University of Louisville Institutional Review Board (IRB) as a quality improvement project. Further, the project was presented and

reviewed by Norton Children's Hospital's IRB for approval to ensure safety of their staff nurses. Written approval, via email, was obtained from the Chief Nursing Officer of Norton Children's Hospital. Additional approval and support were obtained from the nurse manager of the pediatric oncology unit.

Purpose

The aim of this quality improvement project was to develop and implement a BMT orientation for oncology nurses in accordance with guidelines from the governing body of the APHON and TJC. The use of a formalized orientation directly supported the Norton system goal of "Reaching for Zero" to limit preventable harm. The BMT patient is highly acute and requires a unique set of nursing skills. A formalized orientation process taught those important fundamentals to reduce preventable harm. Additionally, this project supported the goal of "Achieving Targeted Operational Improvements", specifically to achieve a high level of competency among nursing staff. The orientation provided in-class and bedside education components to improve knowledge.

Intervention

A multi-faceted orientation intervention was developed for the Addison Jo Blair Cancer Care Center at Norton Children's Hospital. The orientation included a BMT Foundations presentation from the governing body, APHON. As mandated by nursing management, nurses were required to complete the online learning modules. The online learning modules included a specific selection of material as discussed in the *Foundations of Pediatric Blood and Marrow Transplantation: A Core Curriculum*.

Experts of the topic at hand provided the material presented in the learning modules. A Doctor of Pharmacy (PharmD) discussed pharmacological agents (chemotherapy regimens, side-

effects, etc). Attending physicians lectured on the general BMT information. Generalized BMT information included the definition of bone marrow transplant, goals, types, phases (pre-, peri-, post-transplant), the matching process, common side effects, timeline of anticipated treatment, common complications, and organ toxicities. Finally, BMT nurse clinicians lectured on nursing assessment and nursing management. This discussion included how to appropriately evaluate each body-system, how nurses can expect physicians to treat each condition, and how to communicate findings to the treatment team. The discussions of each specialist were aligned with Norton Children's current policies and procedures. Each nurse will maintain access to course materials.

The intervention team was comprised of a PharmD, BMT physician, BMT nurse clinician, and nurse educator. Each member of the intervention team was a specialist of his or her assigned topic. Each member of the intervention team provided the knowledge and was supervising the information translated to each nurse in the orientation. They were provided a discussion on the overall goal and objective of the orientation process. The specialist orientation process will ensure the speakers focus solely on their topic at hand and align their discussion with the goal of orientation. The intervention team assisted the dissemination of the project for full implementation of the quality-improvement project.

Participants

The accessible population for this orientation were staff nurses with at least one year of pediatric oncology nursing experience. At the time of the intervention, there were 50 nurses working on the unit; including new graduate nurses, experienced nurses, and nurses transitioned from other units. Inclusion criteria will be all nurses with at least one year of pediatric oncology experience. Eligible nurses had full-time, part-time and registry positions. Nurses excluded from

this project include nurses from the float team, nurses from other units who do not exclusively work on the oncology unit, and those with less than one year of experience.

To reach prospective participants, the nurse manager identified the eligible nurses and notified them of the requirements. Management sent an email to nurses and posted notification in the nurse report room. Each pretest lacked identifiable information and is anonymous. As a quality improvement project, informed consent was not be required.

Data Collection

A self-assessment was used to collect the nurses' baseline assessment of their self-efficacy and knowledge when caring for the pediatric BMT patient. Baseline assessment helped determine a need for a standardized orientation process. The self-assessment also guided the orientation process and allowed for more materials to be available where the need exists.

The self-assessment was comprised of a Likert-type response and multiple-choice questions. Likert-type responses provided a range for nurses to gauge their level of self-efficacy. Nurses were prompted with situational questions and provided their certainty of ability to perform the given task. Knowledge questions were provided as multiple-choice questions and nurses selected the most appropriate response.

Seven demographic questions such as years of experience, gender, degree of education, certification status, shift worked, how many hours worked per week, and time as a pediatric BMT nurse were asked at the beginning of the self-assessment. Collection of demographic data assisted in data review.

Anonymity of nurses participating in the orientation process was maintained. Nurses were asked to code their pre and post-tests with a four-digit number that is memorable and unique. The nurses were encouraged to use a memorable number as they will be asked to use the

same identifier for their posttest. An example of using a birthdate was provided; August 31st would be 0831. The data collected was secured in a lockbox only accessible to the primary investigator.

There was not a specific budget assigned to this project, the perspective of leadership was it would be relatively cost neutral, any additional expenses would be absorbed through the unit's education costs. The orientation had approximately 20 nurses as orientees, with an average hourly wage of $27.50 per hour before taxes. The combined cost of nurse orientation is approximately $2,200 for the four-hour classroom orientation. There were many hours of preparation and assessments prior to implementing the orientation. These hours included research, planning, implementation, and evaluation of the orientation. The proposed cost of resources (physicians, pharmacists, educators, and clinicians) was approximately $4,000. The materials received from *Foundations of Pediatric Blood and Marrow Transplantation: A Core Curriculum* was recently purchased by the department, prior to the implementation of this orientation process, for a one-time cost of $600. Despite potential budget concerns, upper level management needed to advocate for orientation as a priority as orientation correlated with nurse knowledge and self-efficacy.

Measurement

The anticipated outcomes of this project were to evaluate the mean self-efficacy and knowledge scores, pre-orientation and 3 weeks post orientation, of pediatric BMT nurses. Mean scores were evaluated via pre and posttest. The Nursing Competence and Self-Efficacy Scale (NCSES) (2015) was used to evaluate the mean self-efficacy of nursing staff after orientation. Higher scores indicated a broad knowledge base and high self-efficacy.

The 32-item NCSES was used as a guide to measure the nurses' perception of their self-efficacy in functioning as a pediatric BMT nurse. The tool was developed by Evelyn Kennedy, PhD (2013) who gave permission to use the tool at no cost. The tool was adapted to fit the needs of this quality improvement project, as there are no suitable evaluation tools available. The adapted assessment tool has 12 questions regarding the self-efficacy (Appendix A). Nurses were asked to indicate their degree ability to complete a task and thereby function with high self-efficacy. Each item was rated on a 5-point Likert scale ranging from "certain cannot do" (1) to "certain can do" (5). An overall mean score for the 12 items was calculated, with higher scores demonstrating a higher self-efficacy. The self-efficacy assessment will take approximately 10 minutes to complete.

Psychometric assessment of the NCSES supported construct validity, internal consistency reliability (0.919), and test-retest stability reliability (r= 0.831). The data suggested the NCSES was useful to evaluate interventions aimed at increasing the self-efficacy of practice competence. Expert oncology practitioners (including BMT nurse practitioners, BMT nurse clinicians, and educators) reviewed the tool to determine applicability to pediatric BMT nurses.

Measurement of knowledge was possible from preexisting evaluation tools provided by APHON (Appendix B). The knowledge portion of the pre-test post-test was adapted from the *Foundations of Pediatric Blood and Marrow Transplantation: A Core Curriculum* examination. Scores were determined 0-10 with a higher score demonstrating a higher knowledge base. Incorrect answers were scored with a 0 while correct answers were scored with a 1. The knowledge assessment will take approximately 10 minutes to complete. The questionnaire was provided to oncology practitioners to review for applicability to practice.

The demographic data compiled gave insight into the overall makeup of nursing knowledge and self-efficacy. The participating nurses anonymously disclosed years experience, certification, highest degree completed, shift worked, and number of hours worked per week. Mean descriptive analysis of the demographic data was completed.

Results

In total, 15 nurses were surveyed prior to the intervention. There was a 100% retention rate with the same 15 nurses completing the post-intervention survey. Quantitative data was entered into IBM SPSS for analysis by the primary investigator. Demographic information (Table 1) revealed 66% of the staff had at least a Bachelor's degree in nursing (BSN), 20% of the staff had a Registered Nurse (RN) degree, while 14% had a Master's degree in nursing (MSN). Of the staff who participated in this intervention, 40% were Certified Pediatric Hematology Oncology Nurses (CPHON). The average years of nursing experience was 9.5 years. The participants were nearly evenly divided between shifts with 53% working dayshift and 47% working nightshift. The average hours worked per week was 36 hours.

Analysis of differences in knowledge and self-efficacy gained from the intervention was conducted using paired t-tests for the 15 participants. An alpha of 0.05 (95% confidence interval) was chosen for the sample size (n=15).

Nurse Knowledge Scores

Prior to implementing the orientation intervention, the nurse knowledge scores were surveyed and scored with a correct answer=1 and incorrect answer = 0. Pre-intervention knowledge scores ranged from 50%-100%. These scores were used as a baseline assessment on the level of knowledge of the BMT patient. Figure 1 shows a breakdown of each question and response. Table 2 shows mean scores for each question. Three weeks after the orientation the

nurse knowledge scores increased to a range of 90% to 100%. For 8 of the 10 questions on the knowledge test, the sample of 15 nurses demonstrated increased knowledge. For questions 5 and 7, 100% of the nurses answered correctly on the pre-test leaving no room for improvement on the post-test. On the post-test, 100% of the nurses selected the correct answer. Thirteen of the fifteen participants demonstrated a knowledge score increase from pre- to post-test. Figure 2 shows a breakdown of each questions and responses on the post-test. A paired t-test (Table 5) was used to compare the overall pre- and post- intervention survey results related to knowledge (Pre-M= 0.791, SD= 0.25497; Post-M =9.8, SD= 0.6325). The results indicated that per question (t= 3.002, p= 0.0) there was not a statistically significant improvement in knowledge found between the pre and post intervention knowledge scores.

Nurse NCSES Scores

Prior to implementing the orientation program, the nurses self-evaluated their ability to perform a task. Each nurse survey consisted of 12 descriptive questions evaluating their ability to perform a given task. The survey used a 5-point Likert scale with choices of *Certain Can Do* (4), *Can Do Most* (3), *Neutral* (2), *Can Do Some* (1), *Certain Cannot Do* (0). Pre-intervention means ranged from 2.25-2.58. Figure 3 shows the breakdown of responses of each participant at baseline. Three weeks after the orientation the NCSES scores increased to 3.50-3.66. Figure 4 shows the breakdown of responses of each participant post-intervention. A paired t-test was used to compare the overall pre and post intervention survey results related to self-efficacy. The results indicated that per scenario (t=29.669, p= 0.006) there was a statistically significant improvement in self-efficacy found between the pre and post intervention self-efficacy scores (Table 6). Fifteen of the participants demonstrated a self-efficacy score increase from pre- to post-test.

Discussion

Interpretation

The results of this project support a standardized BMT orientation intervention had a statistically significant effect on improving the self-efficacy of nurses on an integrated pediatric hematology oncology unit. The finding of improved self-efficacy after the educational intervention was consistent with a finding by Manojlovich (2005). The time spent educating nurses to care for a specific patient population is best to improve self-efficacy of nurses. This finding lends credibility for supporting educational resources for staff. The data collected from this project supports the hypothesis that the offering of a standardized orientation did in fact have a significant statistical effect on the participants' self-efficacy when using a pretest/posttest design. The results of this project confirmed a standardized nursing orientation for nurses transitioning to the care of the pediatric BMT patient will improve nursing self-efficacy. Although no causation should be implied, the amount of time spent educating nurses on the BMT patient was accompanied with an increase self-efficacy.

Descriptive analysis of nurse knowledge at baseline and 3 weeks after implementation revealed no statistically significant difference in scores. The results of the t-test also indicated no significant association between the amount of knowledge gained by the nursing staff.

Limitations

While the results of the intervention indicated no significant association amongst the knowledge variable, a few limitations should be considered. First, the ability to capture nurses with limited BMT knowledge was restricted. Due to few BMT patients on the unit, nursing management decided to wait on their education process until the patient population became

available. It is recommended the project is repeated with nurses newer to caring for the BMT patient as they have a more restricted knowledge base. Further limitations could include the environment in which participants took their questionnaire. Participants were requested to answer questions honestly and without help from colleagues. As they were not monitored, it is possible participants utilized resources.

Conclusion

The development of a specialized orientation for nursing staff will expand their knowledge base and self-efficacy. With the increased demand for care of highly acute patients, increasing the knowledge and self-efficacy of nurses is imperative. This creates an opportunity for nursing to expand and make a strong presence for improved patient outcomes. The wide knowledge base and improved self-efficacy will be a benefit for patients throughout their BMT experience. Replication of this project may reflect the need for more training and an increase in available resource for nurses caring for the pediatric BMT patient. Repeating the project in a similar setting, or with other specialized nurses, may help institutions develop more input for nurses caring for the acute patient. For example, additional research involving nursing self-efficacy in pediatric BMT patients may be needed to enhance the care strategies for this patient population. As more information is gathered on nurses caring for this patient population, it may be used to further enhance nurses' skills in BMT patient care. The use of objective data will be key in the ongoing assessment of available orientation programs. Application of this approach may be utilized across the organization to improve the consistency for all nurses transitioning into specialty.

Nursing leadership has received control of further use of the project to drive sustainability for future orientees. Department leaders will continue to support sustainability of

the project. Up-to-date course materials will continue to be accessible from the governing body of APHON to ensure staff is being educated with the most current data. The support of management and governing body of APHON will facilitate change and provide stability and sustainability to the BMT orientation.

Continued backing and support of Norton Children's Hospital is one of the key factors contributing to sustainability. Changes to this orientation may occur based on participant and organizational feedback. Continuing to consider sustainability factors early in the implementation process, creating demand for BMT orientation through the recruitment of new nurses and increased number of patients, and formal communications with management and other stakeholders will promote sustainability.

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Appendix A: Self-Efficacy Pretest and Posttest

1. Can you ***individually*** challenge questionable orders, decisions or actions of other healthcare team members?

Certain cannot do	Can do some	Neutral	Can do most	Certain can do

2. Can you use the appropriate assessment tools and techniques for each body system (e.g. the neurological system) in consultation with clients and other healthcare team members?

Certain cannot do	Can do some	Neutral	Can do most	Certain can do

3. Can you ***individually*** interpret assessment data to draw correct conclusions about clients' health status?

Certain cannot do	Can do some	Neutral	Can do most	Certain can do

4. Can you use critical thinking to make decisions when developing healthcare plans?

Certain cannot do	Can do some	Neutral	Can do most	Certain can do

5. Can you ***individually*** anticipate potential health problems and their consequences for clients?

Certain cannot do	Can do some	Neutral	Can do most	Certain can do

6. Can you ***individually*** determine when consultation with other team members is required?

Certain cannot do	Can do some	Neutral	Can do most	Certain can do

7. Can you manage multiple nursing interventions for clients with complex co-morbidities, seeking appropriate consultation when needed?

Certain cannot do	Can do some	Neutral	Can do most	Certain can do

8. Can you ***individually*** recognize and seek immediate assistance in rapidly changing client conditions that could affect the client's health or safety?

Certain cannot do	Can do some	Neutral	Can do most	Certain can do

9. Can you ***individually*** apply nursing knowledge to meet the clients' physiological needs and to prevent the development of potential complications?

Certain cannot do	Can do some	Neutral	Can do most	Certain can do

10. Can you manage therapeutic interventions safely (e.g. chest tubes, pericardial effusion drains, VOD, TA-TMA)?

Certain cannot do	Can do some	Neutral	Can do most	Certain can do

11. Can you make evidence informed decisions to adjust client care-plans based on changing priorities, in collaboration with clients and health care team members?

Certain cannot do	Can do some	Neutral	Can do most	Certain can do

12. Can you advocate for clients especially when they are unable to advocate for themselves?

Certain cannot do	Can do some	Neutral	Can do most	Certain can do

Appendix B: Knowledge Pretest and Posttest

1. Important factors in determining the type of conditioning regimen include
    a. The patient's diagnosis
    b. The physical condition of the patient
    c. The source of HPCs
    d. All of the above

2. The patient may experience skin impairments caused by which of the following conditioning regimens?
    a. TBI
    b. Busulfan
    c. Etoposide
    d. Thiotepa
    e. Melphalan
    f. All of the above
3. A clinical manifestation that is NOT common with sinusoidal obstructive syndrome (SOS) is
    a. Increased weight
    b. Left lower quadrant pain
    c. Elevated bilirubin
    d. Ascites

4. Clinical presentation of posterior reversible encephalopathy syndrome (PRES) does not include which of the following?
    a. Headache
    b. Seizures
    c. Cortical blindness
    d. Paralysis
    e. MRI with bilateral white matter abnormalities

5. Which nursing intervention would be most helpful in preventing skin breakdown due to radiation therapy?
    a. Applying sunscreen prior to radiation
    b. Avoiding adhesive bandages in the radiation field
    c. Removing the radiation field marks by scrubbing after the radiation is complete
    d. Applying powder to the radiation field

6. Johnny, an 8-year-old boy with AML, is now 5 days s/p allogeneic MUD HPCT. His dad wants to know what organism is most likely to cause infection immediately after transplant (pre-engraftment)?
    a. Virus
    b. Fungus
    c. Parasite
    d. Bacteria

7. Which of the following does NOT influence time to engraftment?
    a. Age of patient at diagnosis
    b. Viral complication
    c. GVHD
    d. Bone marrow microenvironment

8. Which of the following are the target organs in acute GVHD (aGVHD)?
    a. Skin, brain, and lungs
    b. Liver, gut, and skin
    c. Bones, muscles, and heart
    d. Skin, liver, and lungs

9. Which of the following are risk factors for developing GVHD?
    a. Sex mismatch female to male
    b. Negative viral status on donor or recipient
    c. Female donor with a history of six pregnancies
    d. A and C
10. For patients receiving oral tacrolimus therapy as part of their prophylactic GVHD regimen, when is the most appropriate time to draw a drug level with respect to the next scheduled dose?
    a. 4 hours prior
    b. 1 hour prior
    c. 1 hour after
    d. 4 hours after

Table 1

Demographic Information
(N=15)

	Frequency (N)	Percent (%)
Level of education		
RN	3	20
BSN	10	66.7
MSN	2	13.3
Certification status		
Yes	6	40
No	4	60
Experience in years		
1--3	6	40
4--6	1	6.7
7--9	2	13.3
10--12	1	6.7
13--15	2	13.3
16--19	1	6.7
20+	2	13.3
Hours worked per week		
24	6	40
36	9	60
Shift worked		
Dayshift	8	53.3
Nightshift	7	46.7

Table 2

Baseline Knowledge Score

	Mean (M)	Std. Deviation
Conditioning regimens	0.73	0.458
Skin impairments	0.73	0.458
SOS symptoms	0.87	0.352
PRES	0.13	0.352
Preventing skin breakdown	1	0
Infections	0.73	0.458
Engraftment time	1	0
GVHD	0.93	0.258
Risk factors	0.93	0.258
Anti-rejection medications	0.87	0.352

Table 3

Post-Intervention Knowledge Score

	Mean (M)	Std. Deviation
Conditioning regimens	1	0
Skin impairments	1	0
SOS symptoms	1	0
PRES	0.8	0.414
Preventing skin breakdown	1	0
Infections	1	0
Engraftment time	1	0
GVHD	1	0
Risk factors	1	0
Anti-rejection medications	1	0

Table 4

Paired Knowledge Sample

	Mean (M)	Std. Deviation	Significance	t
Post-Intervention Knowledge	0.98	0.6325		
Baseline Knowledge	0.791	0.25497		
			0	3.002

Table 5

Paired NCSES Statistics

	Mean	Std. Deviation	Significance	t
Post-Intervention NCSES	3.4927	0.126		
Baseline NCSES	2.5311	0.169		
			0.006	29.669

Figure 1

Baseline Knowledge Response

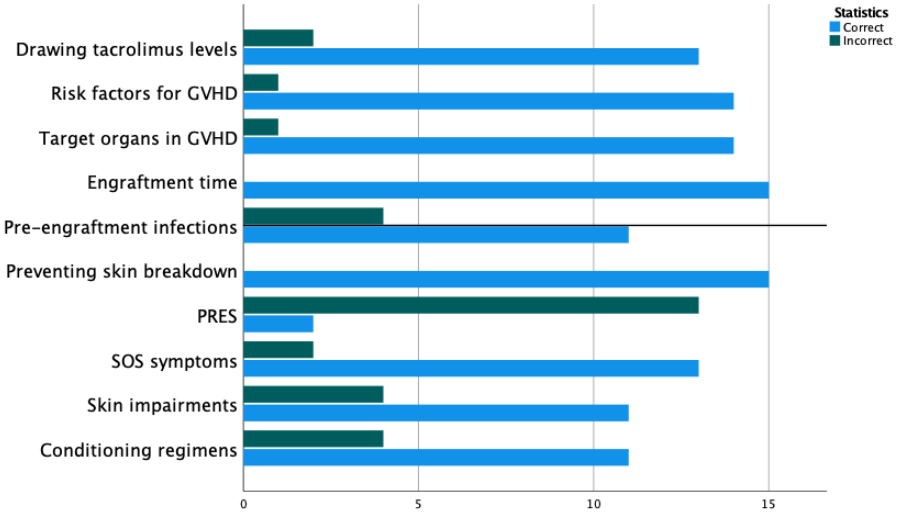
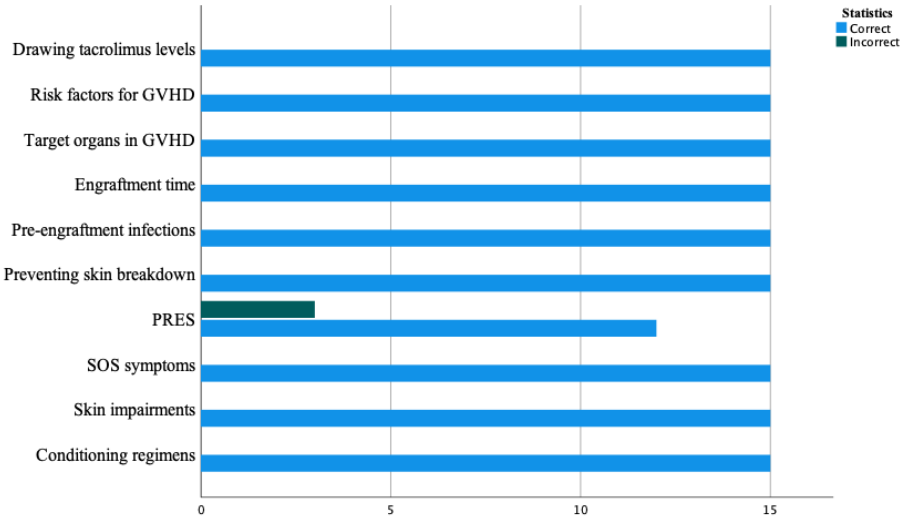


Figure 2

Post-Intervention Knowledge Response



Number Correct

Figure 3

Baseline NCSES Responses

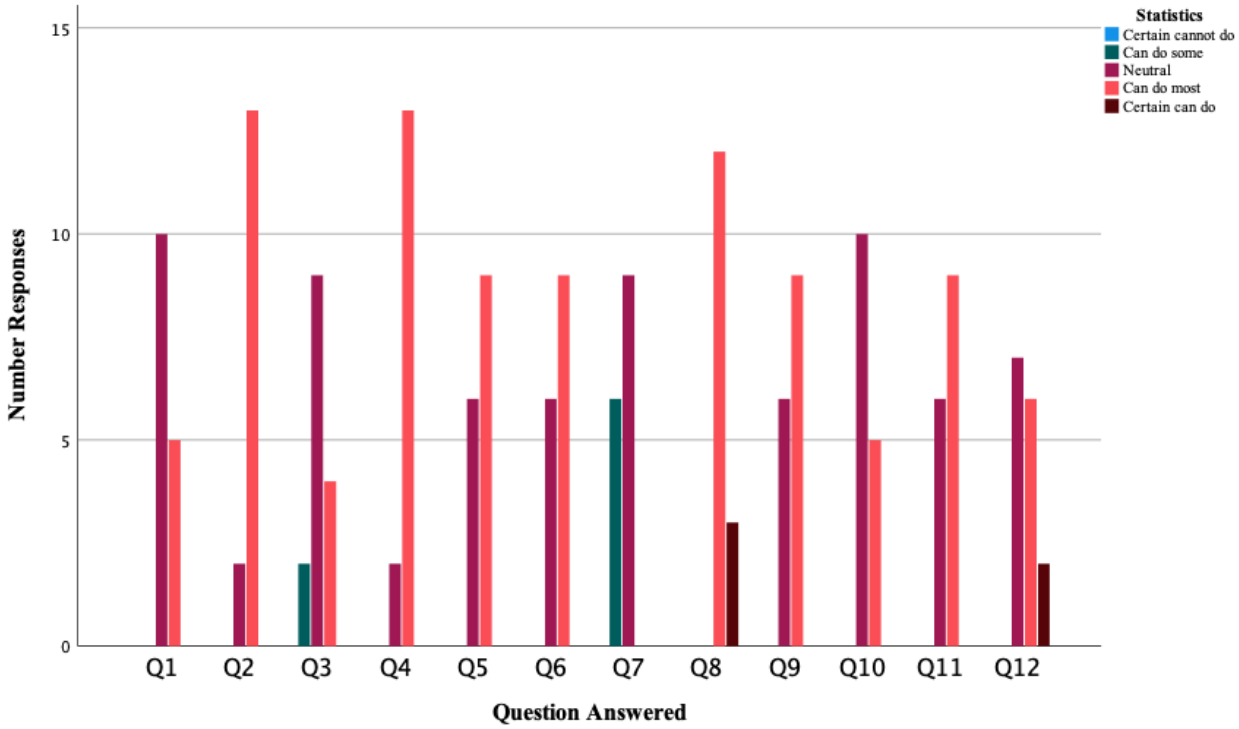


Figure 4

Post-Intervention NCSES Responses