EVALUATING THE DEVELOPMENT OF A PALLIATIVE CARE CONSULTATION ALGORITHM FOR INPATIENT BONE MARROW TRANSPLANT PATIENTS

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ABSTRACT

Nicole A. Capps: Evaluating the Development of a Palliative Care Consultation Algorithm for Inpatient Bone Marrow Transplant Patients (Under the direction of Deborah K. Mayer)

Bone marrow transplant patients often experience increased symptom burden and decreased quality of life due to intense therapy regimens needed for disease treatment. Palliative care services have been shown to improve patient's quality of life and decrease symptom burden. In the acute care setting, the primary method to initiate palliative care is through consultation. Palliative care services are often underutilized in the inpatient bone marrow transplant setting due to clinical practice barriers including provider resistance, inadequate knowledge regarding palliative services, or misunderstanding which patients may benefit from palliative care. Current oncology recommendations and accrediting organizations support incorporating palliative care into patients' plans of care. A current gap exists between evidence-based recommendations supporting palliative care use in oncology patient care and clinical practice. This project developed a palliative care consult algorithm specific to inpatient bone marrow transplant patients to help clinicians best determine which patients may benefit from palliative care services.

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LIST OF ABBREVIATIONS

ACA	Affordable Care Act
APP	Advanced Practice Provider
ASCO	American Society of Clinical Oncology
BMT	Bone Marrow Transplant
BMTU	Bone Marrow Transplant Unit
CKD	Chronic Kidney Disease
CMS	Centers for Medicaid and Medicare Services
CMV	Cytomegalovirus
COPD	Chronic Obstructive Pulmonary Disease
DM	Diabetes Mellitus
DNP	Doctorate of Nursing Practice
ECOG	Eastern Cooperative Oncology Group
FACT	Foundation for the Accreditation of Cellular Therapy
GVHD	Graft Versus Host Disease
HTN	Hypertension
IOM	Institute of Medicine
N	No
NCI	National Cancer Institute
NCCN	National Comprehensive Cancer Network
NCP	National Consensus Project
NPO	Nil Per Os (Nothing By Mouth)
N/V/D	Nausea / Vomiting / Diarrhea

PRN	Pro Re Nata (As Needed)
RN	Registered Nurse
SON	School of Nursing
SOS	Sinusoidal Obstruction Syndrome
VOD	Veno-Occlusive Disease
Y	Yes

CHAPTER 1: INTRODUCTION

Background and Significance

Palliative care has been shown to improve patient and caregiver quality of life, decrease disease symptomology, and even prolong lifespan (NCCN, 2013; Temel, et al., 2010; Bakitas, et al., 2009; Cassarett, et al., 2008). A number of organizations have identified and endorsed the importance of palliative care including the Institute of Medicine (IOM), The National Comprehensive Cancer Network (NCCN), and The Joint Commission (Glare & Chow, 2014; IOM, 2014; Weincke & Coyne, 2014). Additionally, the Centers for Medicare and Medicaid Services (CMS) and the Affordable Care Act (ACA) consider palliative care a measurable patient quality outcome that must be incorporated in appropriate patient's care (NCP, 2013). Unfortunately, even with the strong evidence recommending and supporting palliative care, palliative care consults are underutilized in health care, denying appropriate patients and their families the benefits of this service (Bernacki, et al., 2012). The underutilization is often due to clinical practice barriers and provider resistance, resulting from lack of palliative care knowledge or the misunderstanding of its appropriate use in patient care (Morikawa, Shirai, Ochiai, Miyagawa, 2015; Bernacki, et al., 2012; Weissman & Meier, 2011; Bakitas, et al., 2009).

Problem Statement

Patients needing bone marrow transplants as cancer treatment require intense myeloablative chemotherapy regimens and prolonged treatment courses. These patients can experience debilitating side effects including nausea, vomiting, diarrhea, fatigue, infection,

mucositis, and pain, often needing extensive symptom management (Selvaggi, et al., 2014). The aggressive treatment and consequent side effects negatively impacts patients' quality of life. Palliative care interventions have been shown to improve some oncology patients' symptomology, quality of life, and overall disease course (Ferrell, et al., 2016; Bauman & Temel, 2014; Wiencke & Coyne, 2014; NCCN, 2013; Temel, et al., 2010; Bakitas, et al., 2009; Casarett, et al., 2008; Milberg, 2007; Jack, Hillier, Williams & Oldham, 2006). The most common method of palliative care delivery is through consultation services, meaning the primary medical team consults the palliative care service to provide insight on certain patients' care team to discuss palliative services and interventions with patients and families, and potentially become part of the medical care team (Weissman & Meier, 2011). The palliative care service also offers recommendations to the primary medical team of alternative or additional interventions to provide comprehensive patient care.

Regrettably, palliative care consults are underutilized in the inpatient bone marrow transplant setting due to a myriad of factors including primary teams' preference to manage their own patients and hesitancy to order consults, general provider misunderstanding of palliative services, or the common misconception that palliative care equates hospice (Morikawa, Shirai, Ochiai, Miyagawa, 2015; Bernacki, et al., 2012; Weissman & Meier, 2011; Bakitas, et al., 2009). Lack of or delay in palliative care consults for inpatient bone marrow transplant patients denies them a beneficial service that could improve their symptom management and overall quality of life (Morikawa, Shirai, Ochiai, Miyagawa, 2015; Weissman & Meier, 2011; Temel, et al., 2010). A gap exists between best evidence practice recommendations and actual clinical practice in

regards to implementing palliative care. It follows that a clinical intervention is needed to help clinicians recognize when to initiate palliative care consults and potentially reduce this gap.

Purpose Statement

The purpose of this DNP project was to develop and implement a palliative care consult algorithm for inpatient bone marrow transplant clinicians to use in identifying those patients who could benefit from palliative care and to increase palliative care consults. By using this algorithm, providers had objective criteria to use in referring patients to palliative care and increase utilization of this service. A secondary purpose of the project included documenting the specific interventions implemented by inpatient bone marrow transplant providers to manage patients' symptom burden. This list of specified symptom management interventions was collected to further understand what interventions were already used by inpatient bone marrow transplant providers and perhaps explain why palliative care consults may be lower in the specialized inpatient bone marrow transplant setting.

Research Questions

- 1. How does the implementation of a palliative care algorithm impact the number of palliative care consults on a bone marrow transplant unit?
- 2. What interventions occur by the bone marrow transplant clinicians, preventing them from initiating a palliative care consult, if the algorithm deems it appropriate?
- 3. What changes or suggestions should be made to the palliative care algorithm, if any, as offered by feedback from the inpatient bone marrow transplant clinicians?

CHAPTER 2: REVIEW OF LITERATURE

Review of Literature

The benefits of palliative care services have been well documented in the literature with gains impacting the patient, family, caregivers, hospitals, health care providers, and overall health care system economics (El-Jawahri, et al., 2016; Perrin & Kazanowski, 2015; Bernacki, et al., 2012; Temel, et al., 2010; Bakitas, et al., 2009; Casarett, et al., 2008). Patients report improved quality of life, increased life span, shorter hospital stays, and overall decreased health care costs as a result of palliative care services and interventions (Perrin & Kazanowski, 2015). However, even with the documented improved outcomes, palliative care continues to be underutilized, thus depriving patients of a service from which they would benefit. A disconnect exists between evidence of palliative care benefits and providers incorporating it into clinical practice, with providers often reluctant to initiate consults (Bakitas, et al., 2009). Interventions must occur on the provider level to help increase use of this service (Weissman & Meier, 2011).

Quality care and symptom management improvement is needed for patients facing terminal or chronic illnesses (El-Jawahri, et al., 2016). Patients with chronic and terminal diagnoses report unmet needs from their primary medical team including decreased quality of life and poor symptom management related to chronic pain, fatigue, and psychosocial issues (Bugová, Hajnová, Sikorová, & Jaroová, 2014). Some literature suggests that providers focus mostly on lifesaving interventions and bypass assessing patients' psychosocial needs and disease symptoms (Perrin & Kazanowski, 2015).

Palliative care provides a specialty consult service that has the ability to address care gaps in traditional medicine by focusing on the physical, psychosocial, and spiritual needs of patients that often go unmet (Bauman & Temel, 2014; Bugová, Hajnová, Sikorová, & Jaroová, 2014; Bakitas, et al., 2009). This holistic view often differs from the curative medical model and allows for more comprehensive care of the patient. It is from this unique care approach that palliative care has been shown to improve overall care quality for patients and caregivers (Bauman & Temel, 2014; Bernacki, et al., 2012). As stated, palliative care teams offer holistic care interventions, including pain management, care planning, and antidepressant therapies, that have been shown to improve quality of life, symptom management, and consider the patient's treatment goals (Bugová, Hajnová, Sikorová, & Jaroová, 2014; Bakitas, et al., 2009; Casarett, et al., 2008).

Multiple barriers inhibit palliative care consults from occurring. These include providers delaying referrals until late in the disease course, not referring to the service in general, misunderstanding palliative care and the services it entails, inaccurate association of palliative care with end-of-life and hospice care, difficulty recognizing appropriate patients for palliative care services, and lack of collaboration between the patient's medical team and palliative care services (Morikawa, Shirai, Ochiai, Miyagawa, 2015; Glare & Chow, 2014; Weissman & Meier, 2011; Bakitas, et al., 2009).

As stated, primary medical teams are often reluctant to initiate palliative care consults. The culture of the health care organization and relationship between service lines may impact whether consults occur (Morikawa, Shirai, Ochiai, Miyagawa, 2015; Rocque, et al., 2015). Some research suggests providers may not consult palliative care services due to personal confidence in their own medical knowledge and ability to care for their patients alone, denying

the need of collaboration with other services (Morikawa, Shirai, Ochiai, Miyagawa, 2015). Additionally, medical teams may associate a palliative care consult as insinuating they are unable to provide appropriate care for their patients (Morikawa, Shirai, Ochiai, Miyagawa, 2015; Rocque, et al., 2015). Culture change and provider education may be needed for palliative collaboration to be considered into a comprehensive treatment or care plan (Rocque, et al., 2015).

Some providers have difficulty determining which patients are suitable for palliative care consults and services (Perrin & Kazanowski, 2015; Rhodes, et al., 2015; Bugová, Hajnová, Sikorová & Jaroová, 2014; Glare & Chow, 2014). As providers are the ones who initiate consults, they must be able to determine appropriate patients who could benefit from palliative care (Perrin & Kazanowski, 2015; Bugová, Hajnová, Sikorová & Jaroová, 2014). Unfortunately, many providers lack the necessary education and knowledge of palliative care, the services offered, or when best to initiate a consult (Morikawa, Shirai, Ochiai, Miyagawa, 2015). Absence of palliative care curriculum in medicine and advanced practice nursing education curriculum can prevent providers from having necessary palliative care assessment skills and knowledge (Weissman & Meier, 2011). Additionally, limited availability of clinical palliative care evidence-based assessment algorithm tools further inhibits providers' ability to appropriately recognize which patients need palliative care (Rhodes, et al., 2015; Glare & Chow, 2014; Weissman & Meier, 2011). Without appropriate tools, providers base consult criteria on subjective assessments without objective indicators for when palliative care would be appropriate (Rocque, et al., 2015; Rhodes, et al., 2015; Glare & Chow, 2014). This, together with lack of palliative care education, inhibits providers from knowing when it is suitable to initiate consults. For palliative services to improve the quality of patient care, providers must

have the skills and resources to assess and determine appropriate patients for palliative care consults. Fortunately, palliative care training programs have increased over the last decade as many health provider education programs have incorporated palliative care into curriculum (Wiencek & Coyne, 2014; Weissman & Meier, 2011). Additionally, national guidelines for quality patient care recommendations, interprofessional educational offerings, research endeavors, and palliative care resources have also increased (Grant, Elk, Ferrell & von Gunten, 2009). By expanding palliative care educational opportunities and supporting its use clinically, the utilization of palliative care should continue to increase (Grant, Elk, Ferrell & von Gunten, 2009).

Palliative care is often misunderstood and incorrectly associated with end-of-life or hospice care (Morikawa, Shirai, Ochiai, Miyagawa, 2015). Palliative care does not mean treatment cessation; rather it can coincide with treatment interventions by the primary medical team (Bauman & Temel, 2014). Whereas hospice helps patients and families cope with end-oflife and dying, palliative care strives to reduce suffering, and help patients and families cope with their illness at any stage (Morikawa, Shirai, Ochiai, Miyagawa, 2015). Palliative care is not about treating the cancer itself, but offers another means to help manage the symptom burden and distress it causes. The medicalization of dying suggests the dichotomy of care, that patients either receive curative care or are dying, with no option between (Milberg & Strang, 2007). This dichotomous view of medical care and treatment contributes to the inaccurate association that palliative care must occur only at time of death (Milberg & Strang, 2007). Providers must understand that palliative care can occur with curative treatment and does not mean death or hospice (Morikawa, Shirai, Ochiai, Miyagawa, 2015; Milberg & Strang, 2007). Even when providers acknowledge the difference between palliative care and hospice, patients and families

may associate palliative care with hospice, further preventing providers from initiating consults (Morikawa, Shirai, Ochiai, Miyagawa, 2015). Many patients and families do not understand exactly what palliative care entails or the services offered (Morikawa, Shirai, Ochiai, Miyagawa, 2015). From this, it appears that palliative care education is necessary not only for all health care providers, but also patients and families (Rocque, et al., 2015).

Due to the misconception that palliative care equates with hospice, consults often occur late in the disease or illness trajectory, or not at all (Perrin & Kazanowski, 2015). Some evidence suggests palliative care is often not considered until the last three months of a patient's life (Perrin & Kazanowski, 2015). This delay impacts overall patient care and outcomes, as patients and caregivers report greater satisfaction of care and improved symptomology with earlier consults and interventions (El-Jawahri, et al., 2016; Temel, et al., 2010). Research supports that earlier palliative care consults result in greater symptom management and increased quality of life (Perrin & Kazanowski, 2015). Palliative care can be initiated at any point in the illness trajectory and can occur with or independent of curative or life-prolonging treatment (Bauman & Temel, 2014; NCP, 2013). This follows palliative care may intervene at any stage from diagnosis until death (El-Jawahri, et al., 2016; Perrin & Kazanowski, 2015). As stated, the earlier palliative care intervenes, the greater benefits and outcomes for patients and caregivers (El-Jawahri, et al., 2016; Perrin & Kazanowski, 2015; Temel, et al., 2010).

The aging of the general population also impacts the need for palliative care consults. People are living longer with more chronic illnesses and disease, and the health care system must meet the care demands of the aging population. As the population ages, the number of chronic and terminal diagnoses have increased necessitating greater need for and understanding of palliative care services (Grant, Elk, Ferrell & von Gunten, 2009). Care management of chronic

and terminal illnesses has become more complex requiring multiple disciplines to provide patient care (Bauman & Temel, 2014; Bernacki, et al., 2012). Additionally, comprehensive patient care has become the recommended care model for chronic and terminally ill patients (Morikawa, Shirai, Ochiai, Miyagawa, 2015). This comprehensive care model necessitates a medical model culture change that encompasses holistic and palliative care, in addition to curative therapy (Morikawa, Shirai, Ochiai, Miyagawa, 2015). These changes in disease acuity and course, and inclusion of comprehensive care models suggest that palliative care services will continue to rise (NCP, 2013).

The barriers inhibiting palliative care consults must be overcome to meet the demand for this specialty service (Weissman & Meier, 2011). The growing palliative care need necessitates providers improving their comfort and awareness for initiating palliative services (Weissman & Meier, 2011). Providers must further their education, comfort, and assessment skills with palliative care to incorporate it into their treatment and care plans (Weissman & Meier, 2011; Grant, Elk, Ferrell & von Gunten, 2009).

CHAPTER 3: CONCEPTUAL / THEORETICAL FRAMEWORK

Theoretical Framework

The ecological systems theory provides a novel way of understanding the problem of underutilization of palliative care consults for inpatient bone marrow transplant patients. This problem results from various systems and interactions that are explained using the ecological systems theory. The ecological systems theory focuses on the individual and the multi-leveled surrounding environments that form the personal ecosystem (Bronfenbrenner, 1979). Ecological systems theory describes interactions that occur within and between different environments (Bronfenbrenner, 1979). The theoretical framework serves to understand and organize information about individuals, the interconnectedness of their environments, and how this influences outcomes (Bronfenbrenner, 1979).

In order to understand why palliative care consults are not occurring in the inpatient setting, the ecological systems theory must be expanded to include the health organization systems. The health organization ecological system framework incorporates both Brofenbrenner's ecological systems theory and its applicability to healthcare organizations, as presented in Hancock and Perkins' framework titled Mandala of Health (CCSDH, 2015; Bronfenbrenner, 1979). Per the ecological systems theory, there are five distinct environments surrounding the individual (as shown in the diagram presented in Appendix A) (Bronfenbrenner, 1979). The five environmental levels described in the ecological systems theory include the microsystem, mesosystem, exosystem, macrosystem, and chronosystem (Bronfenbrenner, 1979). These environmental system levels exist within the ecosystem as their own environments while also interacting with other systems and influencing outcomes (Bronfenbrenner, 1979). The center of this system is the individual bone marrow transplant patient who needs a palliative care consult. The microsystem describes the innermost relationships with the patient including family, friends, colleagues, and medical providers. The mesosystem presents the interacting relationships between the participants of the microsystem, such as that between the family and health care provider. The exosystem describes indirect influences of the ecological system that impacts the patient and outcomes without having direct contact with the patient (Wang, Burns & Watts, 2010). For example, organizational factors and differing service provider politics may impact whether a palliative consult occurs. The macrosystem presents broader community factors and can include the culture of the organization (Wang, Burns & Watts, 2010). In medicine, this involves the curative culture of medicine and the value that providers place on curative treatments. The chronosystem constantly evolves and influences the ecosystem as time passes and the patient transitions through care. Understanding the chronosystem of the patients' illness trajectory presents multiple areas for palliative care to occur. Care transitions include events such as diagnosis, increased symptom burden, and death. Palliative care consults may occur at any time throughout the illness. These systems have bidirectional relationships between levels with the outer environments able to impact the inner environments and vice versa. Use of the ecological systems theory and applying it to health care organizational structures presents multiple determinants that influence the barriers and problem of underutilization of palliative care consults.

CHAPTER 4: PROJECT DESIGN & METHODOLOGY

Project Design

This descriptive, quality improvement interventional project developed a palliative care consult algorithm specific to hospitalized inpatient bone marrow transplant patients and evaluated whether its use influenced palliative care consult rates. The project reviewed a comprehensive palliative care database and identified specific palliative care consult criteria used for bone marrow transplant patients. The project also presents specialized symptom management interventions currently used by the inpatient bone marrow transplant medical team to specifically manage the unique symptoms of this particular patient population.

Palliative Care Consult Algorithm Development

For this project, the palliative care consult algorithm for inpatient bone marrow transplant patients used specialized objective criteria to help clinicians identify hospitalized bone marrow transplant patients appropriate for palliative care consults. The developed palliative care consult algorithm consists of ten-item criterion specific to inpatient bone marrow transplant patients. Each individual criterion has allotted points that added together provide a total score suggesting to providers whether a palliative care consult may be necessary.

The project algorithm was developed by modifying the validated NCCN palliative care screening guidelines to be more particular to inpatient bone marrow transplant patients, evaluating a palliative care database to determine detailed palliative care consult criteria specific to bone marrow transplant patients, and from the expert opinions of bone marrow transplant

clinicians. The NCCN palliative care screening guidelines were developed from a panel of oncology experts and have been tested, modified, and validated by other organizations, including the American Society of Clinical Oncology and Memorial Sloan Kettering Cancer Center (Glare & Chow, 2015; Glare, et al., 2013). Therefore, these palliative care screening guidelines seemed appropriate to use as the foundation in developing the palliative care algorithm for this project. As stated, a comprehensive historical palliative care database, maintained at the academic medical center and project site, was accessed to review prior bone marrow transplant patient cases consulted to palliative care. A total of eight palliative care consults occurred for bone marrow transplant patients during the previous five years of recorded data at the project site (2010-2015). This database review provided the specific consult criteria used for these previous bone marrow transplant patients and was included into the algorithm. Expert bone marrow transplant clinician opinion and palliative care provider input were also instrumental in developing this algorithm specific to the hospitalized bone marrow transplant patient population; as each specialty could offer insight on what criteria to include.

Algorithm Implementation Process Design

The project implementation necessitated access to an inpatient bone marrow transplant unit where patients could be evaluated using the developed palliative care algorithm. The project intervention required inpatient bone marrow transplant nursing staff incorporating the palliative care algorithm into their clinical practice. The nurses used the developed inpatient bone marrow transplant palliative care consult algorithm to assess each of their assigned patients with the specified algorithm criteria and scored each patient based on their individualized symptoms and needs. Each algorithm completed on a patient provided a total palliative care algorithm score. If the score suggested a patient was appropriate for a palliative care consult (an algorithm score

>5), then the total score and completed algorithm were given to the charge nurse to present to the inpatient bone marrow transplant providers during patient rounds. The algorithms scoring greater than five were then discussed by the inpatient bone marrow transplant team during medical patient rounds to further evaluate whether a palliative care consult, or other intervention, were needed.

Algorithm Scoring. For the purpose of this project, a palliative care algorithm score of greater than 5 is considered a positive screen and suggests a palliative care consult (Glare & Chow, 2014). A score of greater than 5 was determined appropriate for a positive screen because it indicates the patient met at least two of the screening criteria, and that further symptom management discussion was needed by the inpatient bone marrow transplant medical team. If the algorithm score total did not determine a patient as appropriate for a palliative consult (score <5), a consult did not occur. However, patients could be reassessed again if they were still admitted to the inpatient bone marrow transplant unit, their status changed, their algorithm score increased, or a family member or patient requested a palliative care consult.

Identification of Project Stakeholders

Determination and inclusion of project stakeholders was fundamental for this project's success. The project lead, also the principal investigator for the project and author of this paper, recognized identifying key team members and stakeholders as necessary to achieve buy-in of the project and allow continued utilization of the algorithm. Stakeholders were identified as those individuals who had expert knowledge in either bone marrow transplantation or palliative care, since they offered input and feedback on the algorithm development and throughout the project implementation. Stakeholders were also included who could be instrumental in the continued clinical use of the palliative care consult algorithm, even after completion of this project. The

project lead recognized for this project to have continued utility on the unit and be part of clinical practice change, these vested stakeholders must be identified.

Stakeholders included the bone marrow transplant medical director, bone marrow transplant nurse manager, palliative care service providers, and other bone marrow transplant clinicians including attending physicians, oncology fellows, advanced practice providers (NPs and PAs), pharmacists, and nurses.

Stakeholder input was obtained prior to the project implementation to help create and modify the algorithm; in addition to discuss the project implementation process before it began. The project lead also desired clinician feedback throughout project implementation to guarantee the algorithm was both meeting its clinical function and adequately assessing the needs of the bone marrow transplant patients. Therefore, a feedback survey was sent to inpatient bone marrow transplant clinicians three weeks after the initial project implementation trial period, and then again at project completion. The two feedback surveys allowed clinicians to provide input or suggestions to the algorithm tool or implementation process. The feedback surveys assessed stakeholders' feedback on utilization of the algorithm, ease of use, the length of time the algorithm took to complete, and what changes (if any) they would make to the algorithm.

Symptom Management Interventions

As previously stated, the project also allowed for a secondary intervention of detailing and documenting specific symptom management interventions implemented by the inpatient bone marrow transplant medical team for those patients who screened positive on the algorithm but did not receive a palliative care consult. Of note, bone marrow transplant involves a specialized service of patients with unique symptom presentation and interventions, which may differ from other hospital services and patient populations. Due to the specialized nature of

symptom presentation and unique management, the bone marrow transplant team primarily and exclusively manages bone marrow transplant patients during their treatment course and throughout hospital admission. The unique symptom presentation and interventions specific to bone marrow transplant may help explain why palliative care consults are underutilized in the bone marrow transplant patient population. Therefore, it was important to assess what interventions the bone marrow transplant providers initiate, as this data has not been previously recorded and must be considered when evaluating the use of palliative care services with bone marrow transplant patients.

It was actually during an educational meeting for this project that this secondary intervention was developed. Some bone marrow transplant providers suggested a reason that bone marrow transplant palliative care consult rates may be less than the number of consults with other hospital services is because bone marrow transplant patients have unique symptom presentations and required specialized interventions, best known by the bone marrow transplant providers. They argued that palliative care services might not be needed if bone marrow transplant providers were able to manage the patient's specific bone marrow transplant symptoms. Therefore, it was decided if a palliative care consult was not initiated by the bone marrow transplant medical team for patients with positively screened algorithms, that the team's recommended intervention would be recorded to document specific interventions the team already provides. This data could help further explain or justify the underutilization of palliative care consults for this specialized group of patients.

Methodology

The project intervention occurred on a 24-bed inpatient bone marrow transplant Foundation for the Accreditation of Cellular Therapy (FACT) recognized unit at a large

academic medical and National Cancer Institute designated comprehensive center located in Chapel Hill, North Carolina. The institutional review board (IRB) and nursing research council (NRC) approved the project at the site prior to the palliative care database review and implementation of the project algorithm.

Meeting with Stakeholders

Prior to implementation, the project lead met with key stakeholders of this quality improvement project, including the bone marrow transplant medical director, palliative care providers, bone marrow transplant medical providers, the inpatient bone marrow transplant nurse manager, and inpatient bone marrow transplant nurses, to discuss the basis of the project, the algorithm intervention, and the project timeline. The bone marrow transplant nurse manager and bone marrow transplant medical director supported the implementation of the palliative care algorithm, use of nursing staff and resources to assess patients and complete the algorithm, and having the project lead round with the medical team during patient rounds. The project lead consulted members of the palliative care team to discuss the project, incorporate their expert insight into revising the NCCN palliative care recommendations, and gain access to the palliative care database maintained at the academic medical center. The project lead also met with a bone marrow transplant attending physician, interested in transplant symptom management, who also helped coordinate the algorithm implementation with medical team providers.

Palliative Care Consult Algorithm Development

NCCN Palliative Care Screening Guidelines. The palliative care consult algorithm was developed by modifying the NCCN palliative care screening guidelines to include specific bone marrow transplant palliative care consult criteria data, obtained from a comprehensive palliative care database, and expert bone marrow transplant clinician opinion. The developed

inpatient bone marrow transplant palliative care algorithm followed the general outline of the validated NCCN palliative care screening guidelines for patients with advanced cancer (Glare & Chow, 2015; NCCN, 2013). However, certain criteria on the NCCN screening tool was not applicable to the BMT patient population, and needed modification. Therefore, for this project and algorithm development, the NCCN palliative care screening guidelines were modified to consider data gathered from the palliative care database chart reviews and also include bone marrow transplant provider expert opinion.

Palliative Care Database. As stated, the academic medical center and project site maintains a historical database of prior palliative care consults that occurred in the medical center. The palliative care database includes information such as patient demographics, diagnoses, palliative care consult criteria, length of disease, disease symptoms, hospital service line, and any palliative care recommendations or interventions. A total of eight bone marrow transplant patients were consulted between 2010-2015 (over 60 months) and these charts were accessed and reviewed. From the chart review, data were extracted to determine the specific criteria used for initiating the palliative care consults for these eight bone marrow transplant patients. This data helped define necessary criteria used to adapt the NCCN palliative care screening guidelines to be more specific to bone marrow transplant patients. Together, the modified NCCN palliative care screening guidelines and consult criteria specific to bone marrow transplant patients retrieved from the palliative care database, outlined the initial version of the inpatient bone marrow transplant palliative care consult algorithm.

Expert Opinion. The project introduction and initial proposed inpatient palliative care algorithm were presented during both the inpatient bone marrow transplant nursing and medical provider monthly meetings. During these meetings, expert clinician input was offered on the

algorithm, and changes were made to the initial draft based on these suggestions. A second draft of the algorithm was sent via email to bone marrow transplant clinicians allowing another opportunity for additional input on the algorithm. An updated final and third version, incorporating all suggested modifications, was approved by the bone marrow transplant medical director and again sent via email to the project stakeholders. The final algorithm version was also presented at another bone marrow transplant nursing staff meeting and bone marrow transplant provider research meeting prior to project implementation.

Initial Algorithm Criteria – Draft 1

The initial algorithm (Draft 1) shown in Appendix B consisted of twelve criterion including:

- Initial bone marrow transplant consult within previous 4 months (2 points)
- Functional status of patient (Karnofsky Performance Scale)* (0-2 points)
- Serious transplant-related complications (hemorrhagic cystitis, GVHD grade IV, VOD, CMV, BK) (1 point)
- Significant physical or psychosocial comorbidities (i.e., depression, anxiety, hypertension, diabetes, chronic obstructive pulmonary disease, chronic kidney disease, or heart failure (1 point)
- Other issues complicating care (1 point)
- Uncontrolled symptoms (pain, n/v) (1 point)
- Moderate-to-severe distress related to cancer diagnosis and treatment (1 point)
- Patient / family concerns related to care / decision-making (1 point)
- Patient / family requests consult (5 points)
- Prolonged length of hospital stay (1 point)

• Frequent hospital readmissions (>1 since BMT discharge) (1 point)

As stated, adjustments were made from the initial version of the algorithm based on the feedback and input provided from the project stakeholders, including bone marrow transplant physicians, bone marrow transplant advanced practice providers, bone marrow transplant pharmacists, bone marrow transplant nurses, and the DNP project chair.

Algorithm Refinement – Draft 2

The adjustments made between the initial algorithm draft and the second version (draft 2 shown in Appendix C) were based on the following considerations listed below.

- The criteria point initially allotted for patients needing an *"initial bone marrow transplant consult within the previous 4 months"* was removed due to the subjective nature of whether need for a bone marrow transplant was considered a positive or negative event by the patient. Additionally, the lack of evidence and validation for this point ended in it being excluded from the final version.
- The "functional status of patient" criteria was expanded to include both ECOG and Karnofsky scores, as both functional performance scoring system are used to assess bone marrow transplant patients' functional status at the project site academic center and other bone marrow transplant programs. The scoring point breakdown was also delineated on the final version so that the providers and nurses knew how many points to allot on the algorithm based on the Karnofsky and ECOG scale.
- Further definition of the criteria "*other issues complicating care*" were expanded to include financial concerns and lack of support, to give objective measures that could be scored and not subjectively guessed.

- *"Uncontrolled symptoms"* were also expanded to include diarrhea and constipation, in addition to nausea, vomiting and pain.
- *"The moderate-to-severe distress related to cancer diagnosis and treatment"* was clarified to mention the NCCN cancer distress screening score as the objective screening tool to use for scoring. The initial algorithm version has a score >6 necessitating a point being given for this item. Since this screening tool was currently used at the academic medical center project site, bone marrow transplant nurses and patients were familiar with the tool and screening criteria.
- A blank line was added to allow the nurse completing the algorithm to write their name so the project lead knew which nurse completed the algorithm, in case there was need to contact nurses for questions regarding individual algorithms or inconsistent scoring.
- Additionally, a blank space was added for the name of the bone marrow transplant attending on service. This was also done for the project lead to recognize providers who had questions or concerns regarding the algorithm, and to document any preferred symptom management interventions.

This second draft of the algorithm was sent to stakeholders via email allowing them the opportunity to suggest additional modifications to the developed algorithm.

Algorithm Refinement – Final Draft

As shown below, there were minimal changes made between the second and final version of the algorithm.

• The only criteria change involved "the moderate-to-severe distress related to cancer diagnosis and treatment" point. The palliative care algorithm was edited to allow the cancer distress screening score to match the NCCN cancer distress screening score, with a score >4 (it was previously noted as >6), necessitating a score of 1 point on the algorithm. This was based on the current scoring and recommendations of the NCCN (NCCN, 2014).

The algorithm was reformatted to allow all information to be documented on one sheet, allowing ease of use. Ten criterion were used to formulate the final version of the algorithm (shown in Appendix D) and include:

- Functional status of patient (using Karnofsky Performance Scale or comparable ECOG score) (0-2 points)
- Serious transplant-related complications (including hemorrhagic cystitis, GVHD grade IV, veno-occlusive disease (also referred to as sinusoidal obstruction syndrome), cytomegalovirus, BK virus) (2 points)
- Significant physical or psychosocial comorbidities such as depression, anxiety, hypertension, diabetes, chronic obstructive pulmonary disease, chronic kidney disease, or heart failure (1 point)
- Other issues complicating care, including financial concerns (1 point)
- Lack of support (1 point)
- Uncontrolled symptoms involving pain, nausea, vomiting, diarrhea, constipation (1 point)
- Moderate-to-severe distress related to cancer diagnosis or cancer therapy (1 point)
- Patient/family concerns related to care/decision-making (1 point)
- Patient/family requests consult (5 points)
- Prolonged length of hospital stay greater than one month (1 point)

Frequent hospital readmissions defined as having more than one readmission since initial BMT discharge (1 point) with a total score ranging from 0-16 (Glare & Chow, 2014; NCCN, 2013).

Functional Screening Scales and NCCN Distress Screening Tool. The functional performance status of patient (Karnofsky Performance Scale) score was determined as follows: Karnofsky scale total 80-100 allotted 0 points, Karnofsky scale of 60-79 resulted in 1 point, and any Karnofsky scale totaling less than 60 resulted in a score of 2 points on the algorithm. Of note, this follows the similar point allocation of the ECOG functional assessment and allows for comparable scoring between the two on the algorithm, if needed (ECOG-ACRIN, 2016). Additionally, the moderate-to-severe distress related to cancer diagnosis and treatment was determined using the validated NCCN Cancer Distress screening tool (NCCN, 2016). A score of greater than four on the NCCN Cancer Distress screening thermometer resulted in one point on the palliative care algorithm, as a score of greater than four was determined as moderate-to-severe distress and necessitated further provider intervention per NCCN recommendations (NCCN, 2014).

Algorithm and Project Implementation Education

All stakeholders were provided education on the purpose of developing this quality improvement project; the evidence supporting increased use of palliative care in the clinical setting, and the current gap between best practice recommendations for oncology care and actual clinical practice. Stakeholders were informed of the algorithm development process and their role in the project implementation. Bone marrow transplant clinicians were also educated about the specific inpatient palliative care algorithm consult criteria and need for bi-weekly data collection. Teaching points also included how to score the algorithm, specifics for presenting the

algorithm during patient rounds, directions of what to do with positively (and negatively) screened algorithms, the necessity of documenting medical interventions if a palliative care consult did not occur, and how to contact the project lead with any concerns or questions.

The nursing staff was initially educated about the algorithm during their monthly staff meeting the month prior to implementation, and education was reinforced by the project lead via email and later monthly staff meetings throughout the timeline of project implementation. The purpose of the continuous education and contact was to clarify any questions or concerns related to the algorithm, scoring criteria, or the project implementation, in general. The nursing staff was given a three-week trial period to practice using the algorithm and present any questions or concerns they had with the process.

The nursing staff was also aware that during the first three weeks of the project implementation, the project lead would send staff reminders via email to complete the algorithms on Wednesday and Sunday nights. These regular email reminders were to stop after the initial three-week project implementation trial, as was explained during the education sessions. The reason was to reduce the project lead presence and decrease reminders so the algorithm completion could become part of the nursing culture and practice. The project lead emphasized the importance of the nurses taking ownership of the project and implementing it as part of their clinical practice, without needing the presence of the project lead.

Project and Algorithm Implementation Process

The project implementation occurred over a three-month time period (October 2016 – December 2016) on the inpatient bone marrow transplant unit. The algorithms were completed bi-weekly on Sunday and Wednesday night shift to allow for consistency and adequate time lapse for patient status and symptom presentation to change. Algorithms were not completed

daily due to a concern raised by stakeholders that clinicians may become fatigued of the process and stop completing the project if algorithms were needed daily for every patient. Therefore, it was decided that algorithms should be completed on a bi-weekly schedule. Additionally, Sunday and Wednesday night shift were chosen because the bone marrow transplant medical team develops weekly patient plans-of-care on Mondays. This bi-weekly schedule allowed the current palliative care algorithm score to be available during Monday rounds and part of these plans-ofcare discussions.

Nursing Role. The project lead selected the primary nurse to complete the algorithm on their assigned patients, opposed to the bone marrow transplant medical team, as they were deemed most aware of patients' current symptom burden and knowledgeable of algorithm scoring. A concern the bone marrow transplant medical team discussed prior to project implementation was that patient rounds were already time consuming, and they worried the algorithm would significantly lengthen and burden their daily patient rounding time. To maintain the bone marrow transplant medical team provider buy-in of the project, it further supported having the primary nurse complete the algorithm. By having the primary nurse complete the algorithm, it lessened the time burden on patient rounds, and consequently allowed the medical team to assess the algorithm score and determine whether a palliative care consult or other appropriate interventions were needed, with minimal interruption to the rounding culture.

Patient Rounds. Daily bone marrow transplant unit patient rounds include an attending physician, oncology fellow, advanced practice provider (nurse practitioners or physician assistant), pharmacist, charge nurse, primary nurse, social worker, and nutritionist. Each patient is individually presented to and assessed by the bone marrow transplant interprofessional team, with all disciplines providing insight to the patient's plan of care. The patients with positively

screened algorithms and scores >5 were presented and reviewed during this time. If a patient scored greater than five on the algorithm, the bone marrow transplant medical team considered a palliative care consult. The medical team initiated the palliative care consult if a patient's symptoms worsened after initial bone marrow transplant provider interventions or previous interventions were no longer working. If the bone marrow transplant team did not initiate a palliative care consult, the reason was documented, in addition to what new interventions occurred. Palliative care consults may not have occurred for various reasons including new interventions ordered by the bone marrow transplant team, awaiting results from previously ordered interventions, or patient/family refusal to have a palliative care consult.

The project lead rounded bi-weekly with the medical team and was available to nursing staff to answer any questions or concerns regarding the algorithm and was available at other times by phone or email. The project lead also intermittently completed algorithms, in addition to the ones completed by the nursing staff, to guarantee scoring was consistent among nursing staff. A total of 36 randomly chosen algorithms were completed by the project lead and will be discussed in further detail later.

Implementation Trial Period. An initial three-week trial occurred of the project implementation allowing providers and nurses time to learn how to use the algorithm and provide feedback of the algorithm and implementation process. This input was used to modify the algorithm to best meet the needs of the providers and nurses to promote successful completion of the project. After completion of the project implementation, clinicians were surveyed again to provide feedback on the algorithm, gauging whether they found the algorithm useful, easy to use, and what (if any) parts of the algorithm they would modify.

The number of palliative care consults recorded during this three-month (12 week) project intervention time period were compared to the total number of palliative care consults that occurred over the prior five year (60 month) period, retrieved from the palliative care database. As stated, the primary project goal was to determine whether palliative care consults increased after implementing the algorithm. Results were evaluated by comparing the palliative care care rates pre-and-post intervention.

Feedback Survey. A feedback survey was sent via email to all bone marrow transplant clinicians, three-weeks after the initial project implementation (presented in Appendix E) and again after completion of implementation (shown in Appendix F), asking for input on the ease of use of the algorithm tool, issues or concerns with project intervention, and what changes (if any) were needed. The feedback was used to maintain stakeholder involvement and to also guarantee the algorithm and project were developed to include necessary bone marrow transplant patient symptom criteria.

CHAPTER 5: RESULTS

Outcomes

Algorithm Data. During the three-month project implementation, 210 algorithms were completed in 38 patients on the inpatient bone marrow transplant unit. It is important to note that bone marrow transplant inpatient hospital length of stays average 3-4 weeks. Due to the extended length of time of an inpatient BMT admission, most patients were rescreened multiple times during their admission. Hence why there are more algorithms completed (n=210) than patients screened (n=38). Multiple screenings were appropriate as symptomology, interventions, and patient statuses change throughout a hospitalization for a bone marrow transplant. Of the 210 algorithms completed, 24 algorithms (11.43%) scored positively (> 5) (as shown in Table 1). Table 1. Inpatient BMT Algorithm Data (n = 210)

	#	%
Completed Algorithms	210	100%
Algorithms Scoring Total >5	24	11.43%
Algorithms Scoring Total <5	186	88.57%
Palliative Care Consults from Completed Algorithms	6	2.85%
Palliative Care Consults Resulted from Algorithms Scoring Total >5	6	*25%

Note: *25% result = 6 total PC consults / 24 positively scored algorithm with score >5

Patient Data. Of the 38 patients screened in the 210 completed algorithms, eight scored positively on the palliative care consult algorithm (score >5) (21.05%) and four received palliative care consults (10.53%). Two of the four patients consulted by palliative care were actually consulted twice during their bone marrow transplant admission due to increased and altered symptom presentation and burden. This suggests there were actually six palliative care

consults total during the implementation period since two of the four patients were consulted

twice (as shown in Table 2).

Table 2. Inpatient BMT Patients Screened Data (n = 38)

	#	%
# BMT Patients Screened	38	100%
# BMT Patients Screened Positive (Score >5)	8	21.05%
# BMT Patients Consulted for Palliative Care Services	4	10.53%
# BMT Patients that Received Enhanced Symptom Mgmt from BMT team	13	34.21%

Note: BMT patients may not have been consulted by PC because they scored <5 on PC algorithm OR because the BMT team provided other symptom management interventions.

Symptom Management Interventions

Patients who screened positively on the algorithm (score >5) but did not receive a palliative care consult (4 patients) had varied interventions ordered by the BMT medical team (presented in Table 3). Palliative care consults did not occur for four positively screened patients because of specific interventions listed below or because the bone marrow patient and family refused the option of a palliative care consult. The interventions implemented by the bone marrow transplant team for the patients that scored >5 on the algorithm, but did not receive a palliative care consult included:

- Added symptom management therapies including increasing / altering pain management regimen (4)
- Initiated new anti-emetics not previously ordered (2)
- Started scheduled anxiolytics (1)
- Added an anti-depressant (1)
- Considered additional oncologic treatment and/or second SCT (1)
- Initiated high-dose steroids (2)
- Ordered bowel rest (NPO dietary order) to help with diarrhea / gut GVH symptoms (1)

- Referral to other supportive care services (3)
- Discussed code status (1)
- Evaluated goals of care (1)
- Referral to hospice (1)

Three patients were consulted to other supportive care services offered at the medical

center, specifically the comprehensive cancer support program, which is separate from palliative

care services. Patients who scored positively on the algorithm and considered appropriate for a

palliative care consult were educated of palliative care services by the bone marrow transplant

medical team and their option to be consulted to the service. Families and caregivers were also

informed they could refuse a palliative care consult. Two patients refused palliative care

intervention, preferring to keep all symptom management care with the BMT medical team only.

Table 3. Enhanced Symptom Management Interventions by BMT Team for Patients w	vith
Algorithm Scores >5 NOT Consulted for PC (n=4)	

Pain Intervention	4
Other Symptom Management Intervention (Anxiolytic, Antiemetic, Antidiarrheal)	4
BMT Specific Symptom Management (GVHD, CMV, etc)	3
Referral to Other Services	3
Family / Caregiver Refusal to Consult Palliative Care	2
Hospice Referral	1
Goals of Care Discussion	1
Further Oncologic Treatment	1
Code Status Discussion	1

Note: Some patients scoring >5 on algorithm NOT receiving PC scored >5 more than one time and necessitated multiple interventions from the BMT medical team.

Of note, the number of interventions ordered by the inpatient bone marrow transplant

medical team does not equal the number of positively screened algorithms as patients may score

high enough on the palliative care algorithm to necessitate a consult but do not require additional

interventions outside the specialized inpatient bone marrow transplant standard of care orders.

Some side effects are anticipated throughout the bone marrow transplant process and "pro re

nata" (PRN or as needed) medications are already available to nursing to administer for symptom management as needed. These medications are outlined specifically in the unique bone marrow transplant admission order set. For the purpose of this project, these anticipated chemotherapy and transplant side effects, although distressing, did not necessitate further interventions by the bone marrow transplant medical team or suggest a palliative care consult.

Statistical Significance Using Chi-Square Test

As noted above, a total of six palliative care consults occurred on four different patients during this three-month (12 week) project implementation. Previously, between the years of 2010-2015 (60 months, 260 weeks), eight palliative care consults occurred, per the palliative care database. From these results, it appears use of the inpatient palliative care consult algorithm increased the frequency and use of palliative care services. However, these results must be further evaluated to determine whether the project intervention of implementing the palliative care algorithm for inpatient bone marrow transplant patients resulted in statistically significant results.

The chi-square test was used to evaluate statistical significance between these two, independent comparison groups, at a 99% confidence interval (p = 0.01, z-score > 2.576). The control group includes the total number of eligible inpatient bone marrow transplant patients who could have received a palliative care consult between the years 2010-2015. A total of 802 patients were transplanted during this 260-week period and were eligible for a palliative care consults while inpatient. A total of eight palliative care consults occurred during this 260-week time period, as was determined from the palliative care database records. The treatment group includes the total number of bone marrow patients that were admitted to the inpatient bone marrow transplant unit and were screened with the inpatient palliative care consult algorithm

during the three–month project implementation period. A total of 38 patients were screened with the palliative care algorithm intervention, with a total of six palliative care consults occurring. A computed z-statistic score of 6.9 resulted and provides statistically significant evidence at a 99% confidence interval (p = 0.01, z-statistic > 2.576) that the proportion of patients consulted for palliative care with clinician use of the palliative care consult algorithm differed from the proportion of patients who received palliative care consults without clinician use of the algorithm. Therefore, it follows that use of the inpatient palliative care algorithm resulted in a statistically significant increase in palliative care consult rates, at a 99% confidence interval.

Table 4. Chi-Square Test Comparing Control to Treatment Group

	X	
	Control Group	Treatment Group
	(NO Algorithm Intervention)	(Algorithm Intervention)
# Patients Eligible for PC Consult	n=802	n=38
# PC Consults	8	6
	· · · · 11 · · · · · ·	> 0.57()

Note: p-value = 0.01 (z-score = 6.9; statistically significant since z-score > 2.576)

Algorithm Inter-Rater Reliability

As previously stated, the project lead completed additional algorithms on patients already completed by the primary nurse, to guarantee scoring consistency and assess inter-rater reliability of the algorithm. Of the 36 randomly chosen algorithms completed by the project lead, 34/36 or 94.4% were identical and 2(5.6%) received different total scores, neither of which would have changed whether the algorithm scored > 5 or not, and would necessitate a palliative care algorithm. The criteria where the variance occurred involved evaluating the distress score of the patient with the project lead scoring lower than the primary nurse. Perhaps this was due to the primary nurse having direct contact with the patient and being more aware of their distress screening scoring.

Survey Feedback

The inpatient bone marrow transplant clinicians reported the algorithm was easily incorporated into their daily care and rounds. During the initial meeting with the medical team, concerns arose about the length of time the algorithm would add to patient rounds. From this, it was determined that nursing could screen the patients and provide the positively screened algorithms (those with scores >5) to the charge nurse to report to the bone marrow transplant medical providers during patient rounds. This process allowed consistent use of the algorithm, encouraged nursing input on the patient status and symptomology, and permitted time for the providers to fully evaluate whether a palliative care consult was necessary.

Of note, algorithm implementation and total completion time was not listed as a hindrance from the surveyed feedback obtained after the projection completion. On the postimplementation follow-up survey, medical providers noted discussion of the algorithm added approximately one minute to patient rounds and nurses reported the algorithm took three minutes per patient to complete.

After completion of the 12-week intervention, both clinician groups reported on the follow-up survey that the algorithm did not obstruct their care process or work flow. Nurses reported the algorithm could easily be incorporated into their clinical practice and felt it was beneficial for patients. They acknowledged it allowed an opportunity for them to initiate conversations regarding palliative care with the bone marrow transplant medical team, when they had been hesitant to discuss this topic before. In regard to the algorithm, there were no consult criterion that clinicians would have removed or added outside what was already included, giving the measure face validity. Perhaps this was due to having stakeholder input prior to creating the algorithm and throughout the project implementation.

CHAPTER 6: DISCUSSION

Discussion

Consult Data. Overall, use of the palliative care algorithm for inpatient bone marrow transplant patients increased the number of palliative care consults compared to previous years. The use of the palliative care consult algorithm resulted in six palliative care consults in four patients during the three-month period implementation, and also determined specific interventions for those not receiving a consult (4 patients scoring >5).

Stakeholder Involvement. Obtaining stakeholder involvement from the initial formation of the algorithm and obtaining buy-in was imperative to the successful completion of this project. Prior to project implementation, all clinicians had the opportunity to offer input to the algorithm development, either via email or during in-person meetings and discussions of this project and algorithm. Clinicians could also offer suggested changes to the algorithm and implementation process up to three-weeks after project initiation, and then again after completion of the twelve-week project implementation via the feedback surveys. Having frequent stakeholder input fostered continued buy-in and may encourage future use of the algorithm as part of clinical practice, even after project completion.

Further Education / Clarification. Throughout the intervention period, further clarification or education for the stakeholders was needed. The project lead re-educated the medical staff, primary nurses, and charge nurses of the project implementation guidelines and scoring criteria to guarantee all staff were aware of how and when the algorithm needed to be

completed. Clarification was needed to further explain the screening tools (Karnofsky, ECOG, NCCN Distress Screening) that were part of the algorithm. Additionally, nurses often needed reminders when to complete the algorithm since it was done bi-weekly.

Unfortunately, there was one shift when every nurse forgot to complete the algorithm on its scheduled day. Consequently, email reminders were again added on nights the algorithm was to be completed. Additionally, reminder notes were made to the nursing charge report sheet to prompt charge nurses and nursing staff of when to complete the algorithm. These algorithm reminder interventions improved the forgetfulness issue and allowed algorithms to be completed as scheduled. Nurses reported it took approximately six weeks for the algorithm completion to be better remembered and become part of their routine care without needing reminders.

Nurses also noted misunderstandings of what to do with positively screened algorithms and / or did not always communicate with charge nurses which patients screened positively. Some nurses gave the completed forms directly to the bone marrow transplant medical team, whether the patient screened positive or not, while others filed all algorithms where the blank algorithms were stored, assuming the charge nurse retrieved them. Further education by the project lead during staff meetings and nursing huddles again reminded nurses to give only positively screened algorithms to the charge nurse so these could be presented during rounds and to keep all other algorithms for data collection. Although the confusion of what to do with completed algorithms improved throughout the implementation period, nurses frequently needed reminders of this procedural step of the project.

Limitations

Limitations of the project include that during the intervention time period, the bone marrow transplant patient census on this particular unit was less than anticipated due to

organizational restructuring and openings of other bone marrow transplant units in the region. The decreased patient census resulted in fewer algorithms completed and fewer patients assessed during the project implementation. Perhaps a longer intervention time period where more patients could be accrued would yield different results.

Patient outcomes and symptom management outcomes were also not measured with this QI project. Due to the focus of this project implementation and project aims, patient outcomes were not measured. It would be of interest to assess whether use of this consult algorithm and increased focus on symptom management by clinicians impacted patient's overall outcomes.

Additionally, the inpatient bone marrow transplant clinicians and other stakeholders understood the number of palliative care consultations were being audited by the project lead. This may have led to more consults occurring than would have been done normally. The Hawthorne effect, where behavior alterations by the subjects of a study occur due to their awareness of being observed, must be considered as to whether more palliative care consults occurred as a result of using the algorithm or because of the nurses and providers' awareness of this QI project and professional relationship with project lead.

Finally, although a single-site project location is the purpose of a DNP project, it would be of interest to gauge whether the algorithm implementation presents similar results in other bone marrow transplant settings.

Recommendations

Recommendations for future practice include implementing the algorithm on other bone marrow transplant units and evaluating whether results are reproducible or similar. As stated, this quality improvement project occurred on a single bone marrow transplant unit. Use of the

palliative care consult algorithm should be further implemented at other centers to evaluate outcomes and consequent palliative care consult rates.

Additionally, bone marrow transplant clinician input should continue to be assessed to further determine whether other aspects of bone marrow transplant patient care criteria should be included or removed from the algorithm. Other centers may consider alternate bone marrow transplant patient care criteria not included in this algorithm.

Enhanced Symptom Management. Furthermore, use of the algorithm proved to initiate symptom management discussions of bone marrow transplant patients and implementation of interventions by the medical team. Additional projects could evaluate whether algorithm use increased the number of symptom management interventions overall for patients, in addition to the number of palliative care consults. Additionally, some patients that did not score positively (score <5) on the algorithm (n=13 patients) still received additional symptom management interventions by the bone marrow transplant medical team because of certain positive algorithm criteria (presented in Table. 2). Although these patients did not screen positively on the algorithm (score >5) for a palliative care consult, the individual criteria in which they accrued points suggested to the bone marrow transplant team an intervention was needed. These enhanced symptom management interventions occurred because of the algorithm criteria scoring discussions that occurred between clinicians. This suggests that increased attention was placed on symptom management, not only for patients scoring positively on the algorithm (score >5) and not receiving consults (n=4), but also for patients scoring <5 on the algorithm who needed additional symptom management. The specific interventions for algorithms scoring <5 were not recorded for this project since this project specified interventions were only to be recorded for those patients screening positively on the algorithm (>5), but not receiving palliative care

consults. However, these patients are mentioned to suggest use of the algorithm potentially fostered additional symptom management interventions for bone marrow transplant patients by the medical team, even if they did not screen positively for potential palliative care consults.

Validity and Reliability. Additionally, future projects should implement this algorithm with greater subject numbers to test its validity and reliability. Validity and reliability testing of this novel algorithm specific to bone marrow transplant patients should be formally evaluated to allow for future use in multiple settings. Since this was the initial trial of the algorithm, it follows that additional testing and validation is necessary.

Clinical Practice Recommendations. Recommendations for improving the process of the algorithm clinical process implementation include having reminders on each patient report sheet to signal nurses when to complete the algorithm, so it is not missed. Another recommendation would be to incorporate the algorithm into electronic medical charting systems to allow prompts to appear for nursing to complete the algorithm and so that providers can readily access the algorithm scoring. This electronic medical record access would expedite the algorithm scoring reporting and potentially accelerate palliative care consults, as all information on the palliative care algorithm would be readily available.

Conclusion

Palliative care provides a specialized consult service to help patients manage their disease symptoms, plan for their future treatment and goals, and improve their overall quality of life. A gap currently exists between the documented evidence supporting use of palliative care in clinical oncology practice and its implementation in patient care. Although the evidence and clinical practice guidelines support use of palliative care for appropriate patients, the service is still underutilized.

Quality improvement projects, such as this, must continue to occur to improve use of this service. The development and implementation of this palliative care consult algorithm for inpatient bone marrow transplant patients provides objective criteria for providers to initiate palliative care consults or to refocus on symptom management. As mentioned, the primary objective of this project was to develop a tool that could be easily used by bone marrow transplant clinicians to determine potential patients appropriate for palliative care consults in the inpatient bone marrow transplant setting.

As shown, the number of palliative care consults that occurred during this project implementation period resulted in a statistically significant increase in palliative care consults compared to previous consult data. A secondary outcome documented the unique interventions recommended by the primary bone transplant medical team specific for bone marrow transplant patients' symptoms. These interventions were recorded to present the specialized interventions used by the bone marrow transplant medical team and possibly explain the underutilization of palliative care consults for this unique service line. Awareness of these specific interventions can provide insight to the interventions used by this specialized service and ways bone marrow transplant providers manage their patients' symptom burden currently. The outcomes and data collected from this quality improvement project present a novel palliative care algorithm tool for bone marrow transplant medical team. Together, these outcomes could help increase utilization of palliative care consult services and present the particular interventions needed for this unique patient population.

APPENDIX A: THEORETICAL APPROACH – BRONFENBRENNER'S ECOLOGICAL SYSTEMS THEORY



Pollack, D. (2015). *Bronfenbrenner: Ecologic Systems Theory* [Diagram]. Retrieved from <u>https://www.cheatography.com/davidpol/cheat-sheets/bronfenbrenner-ecological-</u>systems-theory/pdf/.

APPENDIX B: PALLIATIVE CARE CONSULT ALGORITHM FOR INPATIENT BONE MARROW TRANSPLANT PATIENTS – DRAFT 1

Date:
Room #:
Initial BMT consult within previous 4 months? (1 point)
Serious transplant-related complications (hemorrhagic cystitis, GVHD – grade IV, VOD, CMV, BK) (2 points)
Significant physical / psychosocial comorbidities (i.e., depression, anxiety, HTN, DM, COPD, CKD) (1 point)
Other issues complicating care (1 point)
Uncontrolled symptoms (pain, n/v) (1 point)
Moderate-to-severe distress related to cancer diagnosis and treatment (1 point)
Patient / family concerns related to care / decision-making (1 point)
Patient / family requests consult (5 points)
Prolonged length of hospital stay (>1 month) (1 point)
Frequent readmissions (>1 since BMT discharge) (1 point)

Total score: /17 (> 5 suggests palliative care consult)

Palliative Care Consult Ordered? (Circle one) Y / N

If consult not initiated, please explain what interventions occurred:

APPENDIX C: PALLIATIVE CARE CONSULT ALGORITHM FOR INPATIENT BONE MARROW TRANSPLANT PATIENTS – DRAFT 2

Date:	Completed by:	
Room #:	Attending on service:	
Initial BMT consult within previous 4 months?	(1 point)	
Functional status of patient (Karnofsky Performance Scale/ECOG) (Grade 80-100: 0 points, Grade 60-79: 1 point, Grade <60: 2 points)	(0-2 points)	
Serious transplant-related complications (hemorrhagic cystitis, GVHD – grade IV, VOD, C	CMV, BK) (2 points)	
Significant physical / psychosocial comorbidities (i.e., depression, anxiety, HTN, DM, CO	DPD, CKD) (1 point)	
Other issues complicating care (financial concerns, lack of support)	(1 point)	
Uncontrolled symptoms (pain, n/v/d, constipation)	(1 point)	
Moderate-to-severe distress related to cancer diagnosis and treatment NCCN Cancer distress screening score >6 = 1 point	(1 point)	
Patient / family concerns related to care / decision-making	(1 point)	
Patient / family requests consult	(5 points)	
Prolonged length of hospital stay (>1 month)	(1 point)	
Frequent readmissions (>1 since BMT discharge)	(1 point)	

Total score: _____ (> 5 suggests palliative care consult)

Palliative Care Consult Ordered? (Circle one) Y / N

If consult not initiated, please explain what interventions occurred:

APPENDIX D: PALLIATIVE CARE CONSULT ALGORITHM FOR INPATIENT BONE MARROW TRANSPLANT PATIENTS – FINAL DRAFT

Date:	Completed by:	
Room #:	Attending on service:	
Functional status of patient (Karnofsky Performance Scale/ECOG) (Grade 80-100: 0 points, Grade 60-79: 1 point, Grade <60: 2 points)	(0-2 points)	
Serious transplant-related complications (hemorrhagic cystitis, GVHD – grade IV, VOD, C	MV, BK) (2 points)	
Significant physical / psychosocial comorbidities (i.e., depression, anxiety, HTN, DM, COP	PD, CKD) (1 point)	
Other issues complicating care (financial concerns, lack of support)	(1 point)	
Uncontrolled symptoms (pain, n/v/d, constipation)	(1 point)	
Moderate-to-severe distress related to cancer diagnosis and treatment NCCN Cancer distress screening score >4 = 1 point	(1 point)	
Patient / family concerns related to care / decision-making	(1 point)	
Patient / family requests consult	(5 points)	
Prolonged length of hospital stay (>1 month)	(1 point)	
Frequent readmissions (>1 since BMT discharge)	(1 point)	

Total score: _____ (> 5 suggests palliative care consult)

Palliative Care Consult Ordered? (Circle one) Y / N

If consult not initiated, please explain what interventions occurred:

APPENDIX E: 3-WEEK TRIAL FOLLOW-UP SURVEY FOR BMT CLINICIANS

3-Week Trial Survey of the Palliative Care Algorithm for Inpatient BMT Patients

Please answer the following questions.

Is the algorithm user-friendly? How long does it take to complete the algorithm? How much time was added (per patient) to discuss the algorithm during rounds? Should other criteria be included? Should other criteria be deleted / excluded? Any other changes / recommendations / adjustments for the algorithm?

APPENDIX F: POST-IMPLEMENTATION FOLLOW-UP SURVEY FOR BMT CLINICIANS

Post-Intervention Survey of the Palliative Care Algorithm for Inpatient BMT Patients

Please answer the following questions.

Was the algorithm user-friendly? Could / would you incorporate this algorithm into your clinical practice? How long did it take to complete the algorithm? How much time was added (per patient) to discuss the algorithm during rounds? Should other specific BMT patient criteria be included? Should other criteria be deleted / excluded? Any other changes / recommendations / adjustments for the algorithm? Any other changes / recommendations for the algorithm implementation process?

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