The role of the bone marrow transplantation nurse practitioner (BMT NP) has been implemented in most major academic transplantation centers; however, little literature supports the scope of practice and core competencies in this setting. With an increasing shortage of oncologists, opportunities exist for BMT NPs to become leaders in the clinical management of BMT recipients. This article reviews the literature and current professional guidelines to develop core professional and clinical competencies for BMT NPs.

### Methods
A literature search was conducted using PubMed and MEDLINE® with the following search terms: bone marrow transplant, acute care nurse practitioners, nurse practitioners, allogeneic transplant, practice guidelines, role, and scope of practice. This search yielded one applicable publication (Griffith, 1999).

A second search was performed adding the terms management and care of, and excluding the terms role and scope of practice. In addition, publications by the AACN and ONS were reviewed for practice guidelines, standards of care, and competencies.

This article synthesizes core competencies for BMT NPs from the literature and professional organizations. Because BMT NPs practice in outpatient settings, intensive care units, and acute, subacute, and ambulatory settings, the literature

---

**Core Competencies for Bone Marrow Transplantation Nurse Practitioners**

Kristin Elizabeth Knopf, RN, MSN

Hematopoietic stem cell transplantation, referred to as bone marrow transplantation (BMT) in this article, has become an accepted treatment modality for various hematologic malignancies. Transplantation recipients require intensive attention before, during, and after the procedure by a team of healthcare providers. BMT recipients rarely return to their primary care providers soon after transplantation because of treatment-related complications. Although people tend to return to survivorship clinics and their primary care providers after their first year post-transplantation, the majority of their care is received from the transplantation team. The American Society for Blood and Marrow Transplantation has anticipated a shortage of transplantation oncologists in coming years because more than 50% will be older than age 50 by 2020, and an additional 1,264 new oncologists will be needed to fill the anticipated shortage (Gajewski et al., 2009). The deficit in physician coverage creates an excellent opportunity for nurse practitioners to become partners, as well as leaders, in the clinical management of BMT recipients.

**An Opportunity for Nurse Practitioners**

Nurse practitioners (NPs) provide a holistic approach to health care that may improve outcomes for BMT recipients. The impact and value of oncology NPs related to quality, cost-effectiveness, competency, and patient satisfaction are well documented (Bishop, 2009; Bryant-Lukosius et al., 2007). With the growing shortage of transplantation oncologists, NPs can maintain and even increase patient caseloads. Utilizing BMT NPs will likely result in improved patient outcomes because their approach enhances coordination of care across settings (Bishop, 2009; Gajewski et al., 2009; Griffith, 1999; Leger & Nevill, 2004).

Because of their medical complexity, transplantation recipients are not managed independently by NPs, but rather within a close, collaborative relationship with a team of healthcare providers (Griffith, 1999). Despite the current role of the BMT NP in most major academic transplantation centers, limited evidence in the literature supports a standard scope of practice for this specialty. In a survey of Canadian oncology NPs, more than a third of respondents reported that their roles as advanced practice nurses were not clearly defined (Bryant-Lukosius et al., 2007). Two U.S. professional nursing organizations, the American Association of Critical-Care Nurses (AACN), 2006 and the Oncology Nursing Society (ONS), 2007, have published scope of practice, standards of care, and competencies for NPs in their specialty areas.

However, specific scopes of practice, standards of care, and competencies have not been developed for BMT NPs. With the growing need for healthcare providers, scope of practice and core competencies must be defined for NPs caring for BMT recipients across settings.

**References**


Kristin Elizabeth Knopf, RN, MSN, is a nurse in the Hematology/Oncology Bone Marrow Transplant Unit at the Hospital of the University of Pennsylvania in Philadelphia. The author takes full responsibility for the content of the article. The author did not receive honoraria for this work. No financial relationships relevant to the content of this article have been disclosed by the author or editorial staff.

Digital Object Identifier: 10.1188/11.CJON.102-105
The BMT nurse practitioner should be able to formulate a treatment plan for the following.

### BMT Early Treatment-Related Complications (less than 100 days)
- Acute graft-versus-host disease
- Acute kidney injury<br>  
- Acute pulmonary edema
- Alopecia
- Cardiomyopathy
- Diarrhea<br>  
- Diffuse alveolar hemorrhage
- Disseminated intravascular coagulation
- Hemolytic anemia
- Hemorrhagic cystitis
- Imunosuppression<br>  
- Interstitial pneumonitis
- Liver failure<br>  
- Nausea and vomiting<br>  
- Oropharyngeal mucositis
- Pain<br>  
- Palliative care
- Parotitis
- Pericarditis
- Rash or hyperpigmentation<br>  
- Seizures
- Sepsis<br>  
- Syndrome of inappropriate antidiuretic hormone secretion
- Specific chemotherapy-related side effects
- Tumor lysis syndrome
- Veno-occlusive disease of the liver

### BMT Late Treatment-Related Complications (more than 100 days)
- Accelerated atherosclerotic vascular disease
- Cataracts
- Chronic graft-versus-host disease
- Depression or anxiety
- Diabetes mellitus
- Dry eyes or mouth
- Growth impairment
- Hyperlipidemia
- Hypertension
- Hypothyroidism
- Myopathy
- Osteopenia or osteoporosis
- Pain
- Renal insufficiency
- Secondary malignant disease
- Sterility or premature menopause

### Immunosuppression-Specific Problems
- *Candida, Aspergillus*
- *Cytomegalovirus*
- *Gram-negative and -positive bacteremia*

*An early and late treatment-related complication

---

**Figure 1. Core Clinical Practice Competencies for the Bone Marrow Transplantation (BMT) Nurse Practitioner**

Note. Based on information from Gajewski et al., 2009; Léger & Nevill, 2004.

The role of the BMT NP includes more than the management of hematologic malignancies. The proposed core competencies are divided into two broad categories: clinical competencies, including clinical management of BMT-related complications, and professional competencies and procedures.

Patients with hematologic malignancies often develop complications related to BMT (see Figure 1). These early treatment-related effects are primarily seen during the early transplantation period, when patients are hospitalized, and may result in admission to an intensive care unit. After discharge from the acute-care setting, transplantation recipients are seen once or twice per week for the first months, requiring a lot of time with their BMT team (Léger & Nevill, 2004). Late effects generally are identified and managed in the outpatient setting and often are managed independently by BMT NPs (Griffith, 1999) (see Figure 2).

BMT recipients are on immunosuppressant medications for a prolonged period of time, with a taper generally

---

### The bone marrow transplantation nurse practitioner should be able to perform these diagnostic procedures.
- Age-appropriate cancer screening
- Arterial puncture
- Bone marrow biopsy and aspiration
- Bone marrow harvest
- Chest radiograph interpretation
- Electrocardiogram interpretation
- History and physical examination
  - Comprehensive
  - Focused
- Interpretation of pulmonary function tests
- Intrathecal medication administration
- Laboratory value interpretation
  - Anemia workup
  - Chemistry panels
  - Chimeric studies
- Coagulation studies
- Complete blood counts with differentiation
- Drug levels
- Hemolysis workup
- Viral and infectious disease panels
- Lumbar puncture
- Nutrition assessment
- Paracentesis
- Psychosocial evaluation
- Sedation for procedures
- Skin biopsy
- Suturing
- Thoracentesis

---

**Figure 2. Core Clinical Procedural Competencies for Bone Marrow Transplantation Nurse Practitioners**

Note. Based on information from Gajewski et al., 2009; Léger & Nevill, 2004.
The BMT NP is responsible for the following professional core competencies.

**NP-Patient Relationship**
- Establishes caring, supportive, professional relationships with patients, families, and other caregivers to facilitate coping with sensitive issues before, during, and after transplantation and throughout follow-up
- Facilitates decision making regarding complex treatment and symptom-management care
- Supports patients’ physiologic and psychological adaptation throughout the transplantation process

**Patient Education**
- Educates patients about the expected short- and long-term side effects of transplantation, as well as during therapy and follow-up
- Develops interventions with patients and families that are consistent with the patients’ needs and values
- Uses evidence-based information to help patients with cancer and their families make informed decisions and treatment selections
- Promotes patients’ knowledge and empowerment of their role in their own care
- Provides and educates patients about resources (e.g., physical therapy, nutritional counseling, psychosocial support) for support during the transplantation process
- Provides information to patients and families to facilitate adherence to cancer treatment, supportive care, and follow-up

**Professional Role**
- Supports collaborative, interdisciplinary relationships to provide care and facilitates communication between disciplines
- Maintains professional competence and credentials to the role and specialty
- Participates in local, regional, or national-level oncology practice or specialty groups
- Promotes the role of the BMT NP and its significance in improving patient outcomes to the healthcare team, third-party payers, regulators, legislators, and the public
- Translates and incorporates research findings and other evidence for other healthcare professionals to improve and direct patient care

**Healthcare System Management**
- Creates an environment of privacy and dignity for patients
- Identifies aspects of the healthcare system that create barriers to comprehensive care and long-term follow-up for transplantation recipients
- Incorporates payment and reimbursement systems, as well as knowledge of financial aid and resources for patients, including ordering cost-effective treatment
- Documents clinical services provided in accordance with reimbursement regulations and guidelines
- Adheres to institutional, state, and federal laws and regulations regarding patient care

**Ensuring the Quality of Healthcare Practice**
- Promotes an environment for ethical decision making and patient advocacy
- Identifies research questions based on recurrent problems related to transplantation recipients for investigation within the healthcare practice
- Advocates for patients’ and families’ rights to make their own decisions, especially regarding power of attorney, advanced directives, and related issues
- Fosters and prioritizes patient safety in the healthcare environment (e.g., decreasing medication errors, reducing infection rates, pain management, risk assessments)

**Caring for Diverse Populations**
- Provides age-appropriate care and education to patients and families undergoing BMT
- Recognizes and is sensitive to diversity within families, caregivers, and the community that influences patients’ decisions
- Recognizes and accounts for self-bias in approach to patients
- Assesses resources to provide culturally competent care (e.g., translators, research materials, past experience, the collaborating team)

---

Initiated around day 100 and a goal to complete therapy six to nine months post-transplantation. Used during early and late treatment phases, immunosuppressants often cause complications that require acute and critical care admissions and close coordination between intensivists (critical-care specialized physicians) and oncologists (Gajewski et al., 2009). In addition, BMT recipients frequently require steroids for the management of confirmed graft-versus-host disease (Léger & Nevill, 2004). Many BMT recipients experience complications as a direct result of immunosuppressive medications and their associated toxicities. BMT NPs often manage the medications, including immunosuppressive regimens, and collaborate with other members of the transplantation team, especially the primary oncologist and pharmacist, to coordinate care, medication regimens, and follow-up.

The relationships between transplantation recipients and healthcare providers often last for years. Communication within the patient-provider relationship facilitates trust and improves patient outcomes, such as adherence and satisfaction with care (Bishop, 2009). The physical and psychological effects following BMT may be overwhelming for some patients. Emotional concerns may limit patients’ ability to actively participate in their care, and NPs often identify and address their psychosocial concerns. Developing trust within the patient-provider relationship is critical to understanding those concerns and promoting recovery (Gajewski et al., 2009; Griffith, 1999). Working with members of the transplantation team, including social workers and counseling therapists, the BMT NP facilitates holistic care by evaluating the patient’s psychosocial concerns, beginning at evaluation and continuing through follow-up and survivorship care (see Figure 3).

Patient education is a critical component of care before, during, and after BMT. The transplantation, required treatments, and related toxicities can be life-changing and potentially life-threatening. Some long-term side effects begin to appear during hospitalization. NPs are well prepared to teach patients about those potential effects and self-management strategies before trans-
The proposed core competencies are compiled from the standards of care and scope of practice for NPs from ONS (2007) and AACN (2006). They encompass guidelines for both acute care and ambulatory NP roles. The core competencies encourage BMT NPs to clarify the roles and responsibilities within their specialty and allow them to assume leadership roles on transplantation teams and in professional organizations. That is especially important, as the predicted shortage of oncologists will require BMT NPs to act as leaders and advocates for patients. Professional organizations, such as the American Society of Hematology, ONS, and the American Society for Blood and Bone Marrow Transplantation, provide venues for NPs to advocate for the needs of BMT recipients and families (Bishop, 2009). In addition, attending those organizations’ conferences promotes professional visibility for NPs and facilitates the most recent evidence from research into clinical practice. Participation in national conferences and special interest groups also provides networking opportunities with other healthcare providers (Bishop, 2009; Gajewski et al., 2009).

Conclusion

The BMT NP provides specialized care to transplantation recipients across health-care settings. As the need for transplantation oncologists continues to increase, BMT NPs have a unique opportunity to define their roles within this specialty. Although many academic facilities have transplantation teams, many hospitals manage this population without dedicated clinicians from a BMT team. The BMT NP provides holistic health care to transplantation recipients across healthcare settings and coordinates care from the intensive care unit through survivorship.

To develop the professional role of the BMT NP, a set of core competencies is necessary to define the roles and standards of care provided by NPs for these patients. This article proposes core competencies that can be used when assessing actual BMT NP roles or when developing position descriptions or collaborative practice agreements. By actively participating on BMT teams and becoming actively involved with national organizations, BMT NPs can develop a professional role that is integral to the transplantation team and improves outcomes for BMT recipients.

The author gratefully acknowledges Amy C. Joyce, MS, NP, Melissa A. Cochran, MS, NP, at Dana-Farber Cancer Institute, and Jacqueline Smith, MS, APRN, at the Hospital of the University of Pennsylvania, for their mentorship, support, review, and suggestions that were invaluable in the authorship of this article.

Author Contact: Kristin Elizabeth Knopf, RN, MSN, can be reached at knopfk@gmail.com, with copy to editor at CJONEditor@ons.org.

References


