Gap Analysis/Needs Assessment: Stem Cell Transplant

Learning Objectives:

- Discuss the role and clinical importance of hematopoietic stem cell mobilization prior to transplantation, the importance of the timing of collection to the transplant procedure, and the importance of communication between the oncology and transplant teams

- Identify patients who, based on risk factors, are likely to experience difficulty achieving optimal stem cell collection targets within an acceptable number of apheresis sessions

- Develop treatment strategies to maximize the number of stem cells collected during apheresis

- Recognize current therapeutic standards, as well as new and emerging therapies used in hematopoietic stem cell transplantation

Statement of Need

Hematopoietic stem cell transplantation (HSCT) is used to treat hematologic disorders, and also represents an adjunct therapy for solid organ malignancies. Autologous HSCT (auto-HSCT) provides hematopoietic support after high-dose chemotherapy, and it is also important in the treatment of patients with multiple myeloma or non-Hodgkin's lymphoma, representing the only form of cure in some cases.[1-5]

Since 2006, the number of stem cell transplants performed annually has risen from 20,000 to over 50,000, and this number continues to increase by 10-20% each year. Over 20,000 patients have now survived 5 years or longer following HSCT. [6-8]

Stem cell collection from peripheral blood is a standard procedure, and initially involves mobilization of bone marrow stem cells. The patient is given a granulocyte colony-stimulating factor (G-CSF) (filgrastim, lenograstim, perfilgrastim) to stimulate stem cell growth prior to apheresis.[1]

Successful HSCT requires an adequate number of stem cells to be rescued, according to the type of malignancy being treated. Currently, the best predictor of adequate peripheral hematopoietic stem cell yield is the number of CD34+ cells/µL in the blood. The threshold number of stem cells required for adequate rescue of bone marrow is considered to be at least $2\text{-}4 \times 10^6$ CD34+ cells/kg.[9]

Mobilization failures, however, can occur in up to 30% of patients. Consequently, patients who do not mobilize enough CD34+ cells for collection following multiple attempts at apheresis may require bone marrow harvest.[10] Minimizing the number of apheresis sessions required to rescue the appropriate number of stem cells for transplantation therefore improves patient quality of life, and minimizes the costs to the healthcare system associated with multiple procedures.[11]

Once the decision to perform stem cell rescue and transplantation has been made, the clinician must determine the best time to begin collection to increase the chance of collecting at least 2-4 x 10^6 CD34+ cells/kg.[12] Additionally, when treating patients with hematologic malignancies, optimal communication and referral between the community oncology team and the transplant center team are essential.

Novel methods for efficiently obtaining the optimal dose of stem cells for transplantation therefore represent a significant medical need in auto-HSCT. It is thus important for hematologists, oncologists, and transplant specialists to be able to identify poor stem cell mobilizers and select optimal treatment strategies for adequate HSC collection, in order improve patient outcomes, quality of life, and resource conservation. This program will discuss emerging therapeutic strategies for stem cell mobilization, as well addressing the importance of optimizing stem cell mobilization.

Specific current and best practices further defining the educational needs of this program are summarized in the following gap analysis: