Hand Book for Pediatric Hematopoietic Stem Cell Transplantation

Bone Marrow Transplant Program
Lucile Packard Children's Hospital
Stanford University Medical Center

Michael D. Amylon, M.D. & Rajni Agarwal, M.D., July 18, 2001
Updated by Christopher Dvorak, M.D., May 18, 2005

Foreword

The use of hematopoietic stem cell transplantation (HSCT) as a therapeutic modality has been well established. It is the treatment of choice for patients who have aplastic anemia, acute myeloid leukemia and chronic myeloid leukemia with matched sibling donors. It also provides a chance for cure for certain patients with acute lymphoblastic leukemia, Hodgkin or non-Hodgkin lymphoma, solid tumors and marrow failure syndromes. For patients with hematolymphoid illnesses such as thalassemia or congenital immunodeficiencies, HSCT provides the only hope for cure at this time. The value and effectiveness of transplant remains to be proven for patients with sickle cell disease, metabolic storage diseases, some cancers, and other genetic disorders. Newer approaches like umbilical cord blood transplantation, peripheral stem cell collection, early progenitor cell purification, purging of stem cells to remove contaminating tumor cells, immunomodulation for control of graft-versus-host disease and graft-versus-tumor effect, and better supportive care have improved the outlook for many of our patients.

Nevertheless, HSCT is a very intensive and complicated treatment modality that can result in significant morbidity as well as mortality. Many of the clinical issues do have similarity to those frequently seen in oncology patients receiving chemotherapy or radiation therapy. Management of these conditions is well described in our Hematology/Oncology manual. This HSCT handbook is to familiarize care providers with issues more specific to BMT and peripheral stem cell transplantation. We intend to provide brief background knowledge as well detailed procedures and algorithms for management. These should be used as guidelines in our day to day patient care, in the context of frequent communication among the members of the patient care team, to provide optimal care to our patients.

Pre-transplant Evaluation

All patients considered for hematopoietic stem cell transplantation are seen in consultation for a multi-disciplinary evaluation. This will include a medical evaluation regarding the diagnosis and stage of the presenting disease process, the general state of health of the patient and consequent risks of undergoing the procedure, potential infectious risks, and the awareness of patient and family of the risks and potential benefits of the procedure for informed consent purposes. Additionally, Social Services and Psychiatry will examine the psycho-social stresses and supports available to the patient and family, the developmental stage of the patient and its impact on compliance with care procedures and medications, insurance coverage and financial means, and other issues which may impact the likelihood of success. In some cases, extensive neuro-developmental or psychiatric evaluation will be necessary, as well as pre-admission intervention

by Child Life, Occupational Therapy, Social Service, Psychiatry, or other services. During and following the evaluation, each new patient is presented to a multidisciplinary conference and a psychosocial team conference (Tuesday noon) prior to formal acceptance as a transplant candidate.

The following studies must have been performed and evaluated prior to the patient's admission. Results which are not available in Meditech can be obtained from the HSCT coordinator.

For All Patients:

- CBCD
- Chem 23
- Hepatitis panel (hepatitis A, Bs, Bc, and C antibody; hepatitis Bs antigen)
- Serology for EBV, VZV, CMV, HIV, p24 Ag, HSV, HTLV, toxo
- Blood type, indirect Coombs, and platelet compatibility panel
- Quantitative immunoglobulins
- UA
- CXR: PA and Lat
- EKG & echocardiogram
- MUGA scan if anthracycline >250 mg/M2 or preexisting cardiac conditions
- PFT's
- XRT appointment (if pre- or post-transplant XRT is indicated)
- Dental exam with x-rays (try the office of Vernon Adams, DDS)
- Diagnostic LP/BM
- Hickman line, double lumen, preferably >9 French (NO Groshong or Portacath)
- Bactrim ordered (daily, a few weeks before HSCT)
- HLA AB typing
- Protocol specific studies (GFR, audiology, head MRI, etc.)
- Urine Pregnancy test where applicable
- Urine toxicology Screen all patients and donors above 12 years of age.

For Allogeneic patients:

- HLA DR typing
- VNTRs: 3 yellow top tubes with 5 cc to HLA lab

For Donors:

- CBCD
- Chem 23
- Hepatitis panel (hepatitis A, Bs, Bc, C antibody; hepatitis Bs antigen)
- Serology for EBV, VZV, CMV, HIV
- Blood type: ABO and Rh
- HLA AB and DR typing
- MLC for matched sibling donor
- VNTRs
- Autologous unit stored or type and cross for blood

- UA
- CXR

Calculation of Ideal body Weight

The following website has useful information:
http://bmt.stanford.edu/calculators/

Ideal body weight (IBW) is determined by appropriate weight on standard growth chart according to patient height. IBW is used for cyclophosphamide and BCNU dose calculation in some protocols.

For adult size patients, the IBW can be calculated as follows:

Male IBW = 50 kg + 2.3kg (Height [in] - 60)

Female IBW = 45.5 kg + 2.3 kg (Height [in] - 60)

Rapid Calculation of BSA

BSA = v[Wt(kg) x Ht(cm)] ÷ 60

Patients will generally be admitted to the inpatient unit . The conditioning regimen and graft-versus-host regimen orders will have been signed by the Transplant attending and delivered to the inpatient unit by the HSCT coordinator. A transplant schedule will be provided to the admitting housestaff and fellow by the HSCT coordinator giving details of the diagnosis, conditioning regimen, viral serology for CMV and HSV, and the date of the stem cell infusion. Preprinted HSCT admission order sheets are available on the Intranet, and the clinical pathways are available on the nursing unit.

Daily examinations and progress notes by house officers are critical in documenting and communicating information necessary for optimal patient care. Particular attention must be paid to evaluating toxicity from the conditioning regimen, fluid balance, potential infection, signs or symptoms of graft versus host disease (in allogeneic recipients), evidence for engraftment, and primary disease status. The daily physical examination must include a complete skin exam and perineal exam. Daily progress notes should document mucositis, skin rash, volume of diarrhea, and evidence for engraftment in addition to the usual systems oriented information. It may be helpful to document GVHD issues (skin rash, abdominal cramping, diarrhea, bilirubin) and VOD issues (RUQ pain, hepatomegaly, weight gain, ascites, bilirubin) together in a separate section of the note as well as in organ systems format.