

POST DOCTORAL FELLOWSHIP IN BLOOD AND MARROW TRANSPLANT (ADULT & PAEDIATRICS)

Course Duration : One year

1. MEDICAL KNOWLEDGE

1. Pathophysiological principles

1. Hematopoiesis

- Types of Hematopoietic stem cells, including pluripotent versus committed progenitors.
- Basics of hematopoietic differentiation.
- Engraftment of transplanted hematopoietic stem cells.

II. Basic Immunology

- Major histocompatibility complex function, tissue distribution and genetics.
- Lymphoid development
- T-Cell, B-Cell and natural killer cell biology and functions.
- Immunologic memory.
- Antigen presentation, antigen-presenting cells and antigen receptors
- Principles of innate immunity
- Natural and induced T-regulatory cells.
- Immune reconstitution post transplantation.
- SData supporting/Not supporting graft-versus-leukemia/ Lymphoma effect in allogeneic HCT.

2. Indications for HCT (Adult and pediatric)

- Acute and chronic leukemias
- Myeloproliferative and myelodysplastic syndromes
- Plasma cell dyscrasias
- Lymphoproliferative diseases
- Paroxysmal nocturnal hemoglobinuria
- Aplastic anemia and other marrow failure states
- Solid tumors
- Autoimmune disorders
- Hemoglobinopathies
- Pediatric metabolic disorders
- Pediatric primary immune deficiencies, including severe combined immunodeficiency and non-severe combined immunodeficiency forms.

3. Pre-HCT evaluation of recipients and donors

- Recipient disease staging
- Evaluation of recipient comorbidities.
- Donor selection, evaluation of suitability for donation and ethical issues pertaining

to donor choice.

- Stem cell mobilization and collection from peripheral blood and bone marrow.
- Selection of understanding of conditioning regimens.

- Planning for post transplantation therapy if indicated (eg. Radiation therapy, maintenance therapy)
- Assessment of patient's caregiver situation and availability of adequate resources.

4. Pathophysiology, diagnosis, evaluation and management of early HCT issues

- Management of hematopoietic cell infusion toxicities and guidelines for infusion of ABO-incompatibility cell components.
- Principles of infection control (eg. Environment, diet, hand washing, masks)
- Fungal, viral and bacterial prophylaxis
- Short-term complications and an understanding of the relative frequencies of each in terms of different conditioning regimen and immune suppressive therapies including :
 - Mucositis (preventive strategies, evaluation, scoring and therapy)
 - Infections (Evaluation, diagnosis and therapy of all fungal, viral [including cytomegalovirus, human herpes virus 6, adenovirus and respiratory syncytial virus] and bacterial infections)
 - Hemorrhagic cystitis
 - Veno-occlusive disease (liver and pulmonary)
 - Interstitial and non-interstitial pneumonias
 - Diffuse alveolar hemorrhage
 - Hemolysis
 - Organ failure
 - Alloimmunization and transfusion strategies
 - Engraftment (neutrophils, red cells, and platelets) and chimerism
 - Minimal residual disease
 - Early graft failure (Diagnosis and management options)
 - Acute graft-versus-host disease (GVHD) (including alloimmunity, role of CD4 and CD8 cells and methods for prevention of disease and treatment)
 - Common side effects and drug interactions from standard transplantation therapies

5. Pathophysiology, diagnosis, evaluation and management of late HCT issues

- Chronic GVHD
- Post transplantation immunodeficiencies
- Post transplantation autoimmune cytopenias
- Late graft failure
- Relapse (including management with donor lymphocyte infusions)
- Second cancers, including post transplantation lymphoproliferative disease
- Late toxicities of all organ systems
- Long-term follow up guidelines and immunization schedules
- Psychological issues, including those of care-givers.
- End-of-Life issues

6. Methods and interpretations of clinical laboratory testing

- Blood smears
- Cell counting technology
- Flow cytometry
- Red cell autoantibody and alloantibody testing
- Red cell phenotyping and cross-matching
- Basic cell viability assays
- CD34+ cell evaluation
- HLA typing
- Donor search using the NMDP Traxis system
- Apheresis techniques
- Testing methods for chimerism
- Polymerase chain reaction techniques for minimum residual disease
- Infectious disease testing for pathogens, including cytomegalovirus , respiratory syncytial virus, adenovirus, Epstein-Barr virus, fungal and bacterial pathogens
- Interpretation of pulmonary function test results.

7. Indications for appropriate use of, and interpretation of results of procedures related to HCT

- Bone marrow biopsy and aspiration
- Immunophenotyping, cytogenetics and molecular studies of blood and marrow.
- Lumbar puncture and intraventricular access with instillation of chemotherapy by both routes.
- Management of indwelling catheters, including infections in thrombosis.
- Accurate ordering of chemotherapy and anti-emetics.
- Hematopoietic cell apheresis for allogeneic or autologous HCT.
- Cryopreservation of cellular products.
- Thawing and administration of cellular products

8. Use of medications, blood product support and chemotherapies pertaining to the practice of HCT

- Immunomodulating drugs for prophylaxis and therapy.
- Monoclonal antibodies (Eg. Rituximab) in mobilization, preparative regimens and post transplantation regimens.
- Chemotherapy and modifications by organ function.
- All types of blood products.
- Supportive care and medications for pain and symptom management.

9. Knowledge pertaining to the practice of HCT

- Principles of safe and effective blood banking.
- Cryopreservation, storage and manipulation of hematopoietic stem cells and other cellular products used for HCT.
- Requirements for accreditation of a hematopoietic stem cell laboratory from
- Indian regulatory authorities

- When required from abroad countries
- 10 . Knowledge pertaining to the types of grafts used for transplants:**
- Autologous Bone Marrow vs Peripheral stem cells vs cord blood.
 - Allogeneic HLA matched related bone marrow vs peripheral stem cells vs cord blood.
 - Allogeneic HLA Mis-Matched related bone marrow vs peripheral stem cells vs cord blood.
 - Allogeneic HLA matched unrelated bone marrow vs peripheral stem cells vs cord blood.
 - Allogeneic HLA Mis-matched unrelated bone marrow vs peripheral stem cells vs cord blood.
 - Haplo Bone Marrow vs peripheral stem cell transplants.

1. PATIENT CARE

1. Demonstrate clinical skills and the ability to gather pertinent information
 - Perform an effective medical interview and physical examination in both the inpatient and outpatient settings.
 - Choose cost-effective laboratory and imaging studies pertinent to the current problem.
 - Interact with laboratory personnel to gather relevant information about specialized hematologic and HCT-related testing.
 - Acquire and carefully review the patient's records and other clinical information.
 - Manage time effectively.
1. Problem identification and information synthesis
 - Synthesize the relevant clinical and laboratory information into a prioritized differential diagnosis.
 - Unify a clinical and laboratory investigation to provide a coordinated and cohesive approach to diagnosis and clinical management.
 - Generate diagnostic strategies and coordinate laboratory and blood bank efforts to provide effective support for HCT recipients.
 - Apply principles of diagnostic reasoning that include an appreciation of biostatistics (including probability estimates, Bayes Theorem, likelihood ratios and test performance characteristics)
2. Development and execution of a treatment management plan
 - Integrate patient-specific information and diagnostic findings into an HCT plan tailored to the individual patient's unique needs.
 - Understand the importance of comorbidities that may influence the outcomes of HCT.
 - Understand and respond to common drug interactions and side effects.
 - Understand the potential impact of HCT strategies on quality of life.
 - Effectively and compassionately include and engage the nursing staff, patient and family in the development and execution of the HCT plan.
 - Identify and discuss clear outcome goals for HCT.
 - Monitor and encourage compliance.

3. Procedures

- Provide adequate information of risks and benefits of procedures to allow patients make an informed decision regarding consent.
- Provide skillful procedural services , including :
 - Autologous and allogeneic hematopoietic stem cell apheresis.
 - Bone marrow biopsy and aspiration.
 - Bone marrow harvest for transplantation.
 - Lumbar puncture and other intraventricular access and administration of intrathecal chemotherapy.
 - Administration of antineoplastic chemotherapy and immunotherapy.
 - Administration of immunosuppressive medical and biologic therapies.
 - Cryopreservation of hematopoietic stem cells.
 - Thawing and administration of hematopoietic progenitor cells.
 - Administration of therapeutic lymphocyte infusions.
 - Skin biopsy
 - Cord blood collection
 - Stem cell mobilization with GCSF alone, GCSF +/- chemotherapy, GCSF + plerixafor.

1. INTERPERSONAL AND COMMUNICATION SKILLS

- Demonstrate effective communication (both verbal and nonverbal) of medical plans for HCT patients.
- Effectively engage the patients and family in the process of informed consent for HCT and clinical protocols.
- Effectively communicate HCT related recommendations, evaluations, out-patient follow up care needs to the patient, family, referring physician and other support personnel.
- Effectively communicate serious news to patients and families regarding the transition to end-of-life care.
- Effectively discuss advanced directives where applicable.
- Effectively facilitate the flow of relevant information to other members of the HCT team, including nurses, social service workers, therapists, financial, other HCT coordinators, laboratory workers and others.
- Effectively communicate and collaborate with other HCT physicians and transplantation programs.

1. PRACTICE-BASED LEARNING AND IMPROVEMENT

- Demonstrate an ability to devise and implement a plan for continuous quality improvement that is applicable for HCT clinical program, stem cell laboratory or apheresis collection programs.
- Analyze HCT program experience and outcome and perform practice-based improvement activities using a systematic methodology (Eg. Plan-do-study-act) .
- Locate, appraise and assimilate evidence from scientific studies related to patients' health problems and demonstrate the ability to critically analyze scientific studies.
- Use information technology to manage patient information, access on-line medical information and support educational efforts.

- Demonstrate understanding of clinical epidemiology and medical statistics, including clinical study and experimental protocol design, data collection and analysis.
- Demonstrate the ability to teach patients and members of a HCT team.

1. SYSTEM- BASED PRACTICE

- Recognize financial issues related to HCT, including the cost of donor search and acquisition, as well as the costs associated with the prolonged nature of HCT therapy and its complications.
- Understand the impact of contract with insurance companies, health maintenance organizations and Medicaid on financial coverage for HCT and patient care.
- Practice cost-effective health care and resource allocation that does not compromise quality of care; advocate for quality patient care and assist patients in dealing with system complexities.
- Demonstrate the leadership and management skills necessary to provide clinical services in an HCT program, cell therapy laboratory and apheresis collection program.
- Understand quality control procedures and program administration.
 1. Understand the need for and be able to develop standard operating protocols.
 2. Understand the need for and be able to develop record keeping, error tracking and personnel development methods.
 3. Understand the process for and participate in inspection proceeding of regulatory agencies (Eg. NABH, ISO Etc)
 4. Understand the need for conducting cost analysis and for developing and adhering to budgets.

1. PROFESSIONALISM

- Develop and demonstrate a commitment to carry out professional responsibilities and adhere to ethical principles at all times:
 1. Complete records in a timely manner.
 2. Provide for continuity of care.
- Provide patient-centered care at all time points, in the transplantation process in a confidential manner that demonstrates sensitivity to cultural issues.
- Identify and manage conflicts of interest.
- Demonstrate respect, empathy and compassionate use of medical skills for HCT patients receiving either active therapy or comfort care.

Candidate will have to rotate in the following services with in 12 months:

- In patients min 4 months.
- Out patient weekly twice for min 6 months.
- Blood bank, Apheresis unit, HLA and molecular lab 6 weeks.
- Research (data collections and presentations) balance.
- Attend rounds, clinical meetings, journal club, teach junior doctors.

