I. GOALS AND OBJECTIVES

The goal of the Resident Training Program in Transfusion Medicine is to prepare the resident for general competencies in Transfusion Medicine necessary to the level expected of a new practitioner.

II. DURATION OF THE EXPERIENCE

It is expected that residents will spend a total of four months in the Transfusion Medicine Service of Saint Louis University Hospital. Specific activities may vary according to the resident's previous experience, ability, enthusiasm, and data gathering skills.

III. COMPETENCY BASED GOALS AND OBJECTIVES. These should be accomplished by the completion of the residents 4 month experience in transfusion medicine. See appendix I

IV. DUTIES AND RESPONSIBILITIES

The first month of the program is devoted to developing technical expertise in the red cell serology laboratory. The resident will master basic red blood cell serology and develop familiarity with techniques to perform ABO and Rh typing, antibody screen, antibody identification, cross matching and the direct antiglobulin test. Advanced serologic techniques may vary depending on the resident’s previous experience. The resident will become familiar with major clinically significant red cell antigen systems (ABO, Rh, Kell, Kidd, Duffy, MNSs) their frequency, frequency of antibodies to these antigens, clinical significance and transfusion management. The resident will become familiar with the commonly encountered clinically insignificant antibodies, including Lewis, P, I and HTLA, and their transfusion management. The resident will learn the indications for each blood component, its content and potential adverse effect. The resident will develop an understanding of the process and organization of the Transfusion Service from donor screening to transfusion, including blood collection, component manufacturing and storage, compatibility testing, transfusion practices and the benefits/risks to transfusion therapy. Data gathering skills for analysis of transfusion medicine problems are developed.

The activities of the second and third month of the rotation are designed to provide the resident with experience on the transfusion service. The resident will follow patients with complicated transfusion needs and develop consultative skills through interactions with the house staff, nurses, attendings and technical staff. The resident will know the acute, delayed and chronic complications of transfusion, their pathogenesis, diagnosis, treatment and prevention including acute and delayed hemolysis, fever chill reactions, allergic reactions, anaphylaxis, TRALI, TAGVHD and septic transfusion reactions. The resident will become familiar with transfusion associated infectious diseases including HIV, hepatitis, HTLV, bacteria, nvCJD, CJD, syphilis,
malaria, babesia, West Nile Virus and Chagas disease. The resident will perform a clinical investigation and laboratory interpretation of transfusion reactions independently and report to the Medical Director of the Transfusion Service. The resident will develop an understanding for patients with special blood component needs, including indications for CMV negative/safe, irradiated, and leuko-reduced blood components. The resident will review questionable orders for blood components to assess appropriateness. The resident will review and evaluate red blood cell serology problems and emergency release forms. The resident will become familiar with the principles of transfusion support in solid organ transplantation and bone marrow transplantation. The resident should become familiar with blood component support during pregnancy and the newborn. Residents are required to attend the Quality Assurance meetings and are expected to have a familiarity with roles of the regulatory agencies that govern the transfusion services, including AABB, FDA, CLIA, State, CAP.

The activities of the fourth month will be divided between donor services, blood component manufacturing, HLA laboratory, BMT/HPSC laboratory and paternity testing. The resident will also complete a written exam, serologic examination and present an inservice to the Transfusion Medicine Staff. The resident will spend 2 weeks in donor services to gain an understanding of all aspects of blood recruitment, collection, manufacturing and distribution. Residents observe these activities in a cGMP environment. The resident will learn donor criteria for allogeneic and autologous whole blood donation and regulatory requirements for the storage, transportation, receipt and expiration of each blood component. The resident will also become familiar with the principles of therapeutic hemapheresis. The resident will review the apheresis instrument with the nurses, observe the performance of therapeutic plasmapheresis, discuss with the nurses and attendings the indications, and complications of therapeutic apheresis, fluid replacement and treatment course. The resident will follow patients on the service and report any changes of clinical status to the Medical Director of the Transfusion Service. The resident will observe the collection of stem cells and infusion. The resident is required to attend bone marrow transplant meetings. The resident will arrange a visit to HLA laboratory to develop an overall understanding of the processes. Residents should observe serologic and molecular methods for class I and class II typing if possible. Residents will discuss with staff the use of HLA typing in the platelet donor, stem cell and solid organ transplant setting. Residents should understand the indications for paternity testing, know the techniques used for testing and their interpretations, gain an understanding for direct and indirect exclusions and become familiar with inclusion probability determination. An understanding of paternity testing may be developed through required reading materials and discussions with staff. Residents will arrange a visit to the hematopoietic stem cell laboratory with the HSC laboratory supervisor. Residents are expected to observe the processing, enumeration, freezing and storage of autologous and/or allogeneic stem collections. Residents will become familiar with the Standards For Hematopoietic Progenitor Cell Service. Residents are expected to participate in a mock CAP inspection of the Blood Bank at the University Hospital.

On-Call Responsibilities: Residents will be expected to take call from 8 AM to 5 PM beginning the second week of the rotation. An attending is on call with the resident at all times. Initially, the resident will review all calls with the attending. As the resident progresses, he/she can independently handle straightforward calls.
V. TEACHING STAFF

The teaching staff includes the medical directors of the transfusion service, managers, supervisors and technical staff in blood bank, Blood Donor Services, HLA, HPSC and viral testing laboratories.

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V. MANNER OF SUPERVISION

Evaluation of the resident is performed by the medical directors of the transfusion service with input from the teaching staff. Evaluation is documented with the resident evaluation form provided for that purpose by the Residency Training Director.

VI. OUTCOME TESTING METHODS

Each resident rotating through the Transfusion Service will be expected to:
1) Perform satisfactorily (> 60%) on a written exam in transfusion medicine which covers transfusion medicine, blood bank, hemapheresis, and viral testing.
2) Demonstrate an understanding of blood group serology techniques through correct identification of serologic unknowns used exclusively for teaching materials.
3) Present a 15 – 20 minute discussion on a current or relevant topic to the Transfusion Medicine Staff

REQUIRED READING


Text books will be made available to the residents for use in the Blood Bank and Blood Donor Services.

RECOMMENDED READING


The following journals should be read: "Transfusion", "Journal of Clinical Apheresis" and "Transfusion Medicine Review", and Technical Publications of the American Association of Blood Banks.

**REQUIRED CONFERENCES**

8:00-8:15 a.m. sign-out rounds on Mondays and Fridays

12-1:00 pm Lab Medicine Rounds, Tuesday

10:00-11:00 am. Blood Bank Quality Assurance on Mondays

1:00-2:00 p.m. BMT conference on Wednesdays

1:00-2:00 p.m. Hematology/Oncology Clinical Rounds on Friday

**RECOMMENDED CONFERENCE**

12:00-1:00 p.m. Stem Cell Transplant Conference
Appendix 1 – Competency based goals and objectives

1. Patient Care:
   a. Understand principles of proper transfusion administration, and importance of proper patient identification according to written blood administration protocols
   b. Understand all aspects of specimen accessioning in the Blood Bank
   c. Appreciate risks and benefits of transfusion therapy and understand the concept of optimizing transfusion therapy to maximize clinical utility
   d. Monitor patients undergoing transfusion therapy and recognize occurrence of adverse reactions. Understand how these are reported and evaluated in the Blood Bank.
   e. Review atypical serologic investigations and appreciate the clinical implications.
   f. Evaluate and monitor patients undergoing therapeutic apheresis and stem cell donation prior to and during the procedure.
   g. Evaluate and monitor donors undergoing autologous red cell and allogeneic platelet and stem cell donation prior to and during collection.
   h. Participate in the clinical management of blood donors.

2. Medical Knowledge
   a. Understand principles of immunohematology, including compatibility testing and associated applications
      i. Importance of clerical check to insure proper patient identification;
      ii. Knowledge of major erythrocyte blood group antigen systems
      iii. Testing procedures including fundamentals of ABO and Rh blood grouping techniques;
      iv. Principles of the major and minor crossmatch, serologic and electronic (computer) crossmatch, and, antibody screening procedure for the identification of irregular antibodies;
      v. Application of erythrocyte panels in the identification of irregular antibodies;
      vi. Application of various techniques in the identification of irregular antibodies including use of Gel, LISS, PEG, homozygous testing cells and enzyme treated cells;
      vii. Procedures employed in evaluating a specimen exhibiting a positive direct antiglobulin test including the use of mono and polyclonal anti-human
globulin reagents and techniques for antibody elutions when clinically indicated

viii. Indications for and procedures utilized in the performance of antibody titrations and methods to detect and quantitate fetal-maternal hemorrhage;

ix. Principles of in vivo crossmatch procedure; the laboratory and technical procedures employed in identification and evaluation of a suspected transfusion reaction.

x. Fundamentals of blood component handling and processing including: indications and dosage calculations for use of blood components in adults and children including, RBCs, plasma, platelets and cryoprecipitate

xi. Indications and techniques for washing red blood cells

xii. Steps employed in proper thawing and storage of fresh frozen plasma; and in the proper thawing, pooling and storage of cryoprecipitate; the steps employed in the handling, pooling and appropriate storage of platelets;

xiii. Principles, techniques and applications of blood irradiation in the prevention of transfusion-associated graft versus host disease

xiv. Utility of pre-storage leukocyte-reduced blood for the removal of the CMV virus and reduction in the occurrence of HLA alloimmunization

xv. Impact of the HLA system on transfusion medicine practices

xvi. Steps involved in blood and blood component administration including identification procedure, the nature of IV access, compatible fluids, appropriate filtration, application of a blood warming device as indicated, duration of the transfusion and proper documentation.

3. Practice-Based Learning and Improvement
   a. Perform literature searches correlating pertinent current scientific information with clinical problems and case consultations.
   b. Complete written reports of transfusion reactions.
   c. Learn from presenting cases to the Blood Bank-Transfusion Medicine Attending, at daily meetings.
   d. Participate in Check out rounds and laboratory medicine rounds, reviewing critical and clinically significant events on the transfusion service.
   e. Present case summaries and participate in discussions, as appropriate, at clinical conferences.

4. Interpersonal and Communication Skills
   a. Serve as the interface and liaison between the Blood Bank and Donor Apheresis Center staffs, the clinical nursing staff and clinical housestaff
   b. Interact with other Pathology residents for weekend and evening call coverage
5. Professionalism
   a. Maintain a clean and appropriate professional appearance
   b. Act respectfully to all members of laboratory, clinical healthcare teams, patients and family members
   c. Answer pages promptly when on service and on-call
   d. Attend to clinical duties as indicated and when instructed to do so by the Transfusion Medicine-Blood Bank attending
   e. Attend conferences and meetings, arriving punctually

6. Systems-Based Practice
   b. Understand utility of computer data management for retrieval of information.
   c. Participate in Blood Bank Administrative and Process Improvement activities.
   d. Address ethical issues in transfusion management such as futile use of large amounts of blood and blood products in patients, especially those of blood group O, who are clinically beyond recovery.
   e. Understand, and address as indicated, the risks and benefits of transfusion therapy.
   f. Help to participate, as indicated, in FDA-mandated lookback and BPDR programs.
   g. Know the fundamentals of accreditation requirements for blood banks, as put forth by the American Association of Blood Banks.