Transfusion Medicine Fellowship Goals & Objectives

1. Transfusion Service Training

Patient Care

Major Goals: To learn to diagnose and manage transfusion medicine issues in diverse patient populations.

Objectives:

Skill Level I

- Demonstrate knowledge of the principles of patient and/or unit identification and pre-transfusion testing, including ABO and Rh testing, RBC antibody screen and antibody ID. (PC, MK)
- Demonstrate knowledge of the principles of patient testing and identification for transfusion reaction evaluation including clerical checks, ABO verification, hemolysis checks, DAT, urinanalysis and antibody ID. (PC, MK)
- Demonstrate familiarity with the principles of antibody titer testing in HDN, cold agglutinin disease, ABO incompatible progenitor cell transplant and immunodeficiency disease evaluations. (PC, MK)
- Choose appropriate crossmatching methods for various patients (e.g. Fast, Full Coombs, Massive, Electronic) and be able to calculate the percentage of random donor units would be compatible for patients with antibodies. (PC, MK)
- Recognize and appropriately refer serologic evaluations that are beyond the scope of a hospital-based transfusion service and/or blood bank (PC, SPB)
- Describe the expected response to transfusion therapy in adult and pediatric populations (PC, MK)
- Differentiate the symptoms and signs of hemolytic and non-hemolytic transfusion reactions and demonstrate knowledge of the pathophysiology, treatment and prevention of these complications. (PC, MK)
- Demonstrate proficiency in evaluating patients with immune-mediated and non-immune mediated hemolytic anemia and in the appropriate testing and transfusion management of these patients. (PC, MK)
- Demonstrate knowledge of potential side-effects of neonatal whole-blood exchanges apheresis, extracorporeal circuits such as extracorporeal membrane oxygenation and cardiac bypass (PC, MK)
- Discuss the transfusion issues associated with massive transfusion in neonates. (MK, PC)
- Demonstrate knowledge of the pathophysiology and treatment of neonatal alloimmune thrombocytopenia. (PC, MK)
- Demonstrate proficiency in the evaluation and appropriate transfusion therapy of adult and pediatric thrombocytopenic patients secondary to both immune and nonimmune etiologies. (PC, PBL)
- Demonstrate a working knowledge of the principles of hemostasis and coagulation and proficiency in the initial treatment of patients with congenital and acquired bleeding disorders. (PC, MK)
- Demonstrate ability to select or recommend appropriate plasma/factor replacement products. (PC, MK)
• Demonstrate knowledge of the transfusion requirements of special patient populations particularly hematology-oncology, transplant, geriatric, pediatric, obstetric, burn, and trauma. (PC, MK)

**Skill Level II**

• Demonstrate knowledge of options for preventing volume overload in pediatric patients. (PC, MK, PBL)

• Identify clinically significant RBC-specific antibodies from an antibody panel, calculate the probability of finding compatible blood, calculate the number of units that need to be screened to provide compatible units, determine how difficult it will be to find the required units, calculate the probability that the patient had received antigen positive blood and effectively communicate the significance of these results to a clinician. (PC, IC)

• Demonstrate proficiency in evaluating and recommending treatment plans for complex transfusion reactions. (MK, IC, SBP, PC)

• Discuss blood requirements for intrauterine and neonatal exchange transfusion. (PC, MK)

**Skill Level III**

• Demonstrate an understanding of the necessity for and the patient care issues of transfusion of serologically incompatible blood in select clinical circumstances. (PC, MK)

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**Medical Knowledge**

**Major Goals:** To know and understand the scientific and medical principles that guide current transfusion therapy.

**Objectives:**

**Skill Level I**

• Identify the major infectious complications of blood transfusions and the current risks and explain how these can be prevented. (MK)

• Identify the major non-infectious complications of blood transfusions, including TRALI, know the risk for these complications and strategies to prevent them. (MK)

• Demonstrate knowledge of the indications for CMV-reduced-risk blood, leukoreduction, irradiation, and washing of blood components. (MK)

• Demonstrate practical working knowledge of Rh system including prediction of Rh genotype based on phenotype, prediction of phenotype based on genotype, Rh variations, weak D and partial D. (MK, PC).

**Skill Level II**

• Demonstrate ability to distinguish clinically significant from insignificant RBC antibodies. (MK)

• Demonstrate knowledge of various methods of blood conservation and management, including preoperative evaluation of anemia and bleeding disorders, pre- and perioperative autologous blood collection, and approaches to bloodless surgery. (MK, PBL, SBP)

• Demonstrate knowledge of landmark published studies in TM. (MK, PBL)

• Differentiate between plasma-derived and recombinant factor products and demonstrate knowledge of on-label and off-label indications for same. (MK, PC, PL, SP)

**Skill Level III**
• Demonstrate ability to interpret difficult antibody panels including those containing multiple alloantibodies, autoantibodies, and antibodies to high frequency antigens. (MK, PC)
• Demonstrate familiarity with the appropriate use of highly specialized blood products (e.g. granulocytes, donor lymphocyte infusions, HLA matched platelets, factor concentrates). (MK, PC)
• Describe the normal physiologic role of certain molecules that bear blood group antigens (ABO, Rh, Kidd, Duffy). (MK)

Practice Based Learning

Major Goals: To develop a process for ongoing acquisition of medical knowledge & skills based on experiences with transfusion medicine cases.

Objectives:

Skill Level I

• Locate, appraise and assimilate evidence from scientific studies related to their patients’ health problems
• Use information technology to optimize learning
• Use eLibrary/CRC resources to evaluate blood requests.
• Choose appropriate blood components and derivatives based on a thorough knowledge of the indications for transfusion and evidence based medicine studies. (PBL, PC, MK)
• Demonstrate knowledge of the pathophysiology, prevention, and treatment of hemolytic disease of the newborn. (MK)
• Recognize those antibodies in pregnant patients that are clinically significant and make appropriate recommendations for blood products for mother and fetus. (PBL, MK, PC)
• Apply principles of evidence based medicine, laboratory studies and clinical experience to management of the massive hemorrhage. (PBL, IC, SBP, MK)
• Demonstrate ability to do Blood Utilization Reviews. (PC, SBP)

Skill Level II-III

• Demonstrate proficiency in evaluating and presenting findings to professional colleagues from recent peer reviewed journals and research projects the Fellow may be involved in. (PBL, IC)
• Demonstrate proficiency in evaluating patient’s refractory to platelet transfusions, including the clinical evaluation as well as the principles of histocompatibility testing and the roles of HLA matched vs crossmatched platelets. Apply this knowledge by selecting appropriate platelet products when indicated. (PC, PBL, MK)

Interpersonal Communication

Major Goals: To develop the oral, aural, written, technologic and attitudinal skills that build strong relationships with patients, physicians, health care professionals, and other members of the health care team.
Objectives:

Skill Level I

- Demonstrate ability to communicate laboratory testing results, transfusion recommendations, and blood supply issues to clinicians, both verbally and in written or electronic form. (IC, SBP, PC)

Skill Level II

- Demonstrate competence in management of blood inventory and ability to communicate effectively the hospital needs with the blood supplier. (IC, SBP)
- Demonstrate ability to write an appropriate consult note for a patient who has an alloantibody, explaining the clinical significance of the finding to the treating physicians and the additional logistical requirements for obtaining compatible blood. (IC, SBP, PC)

Skill Level III

- Demonstrate proficiency at preparing educational presentations on TM topics and the ability to adapt the presentations to audiences of differing experience levels (pathologists, nurses, technologists, other physicians) (IC, MK)

Professionalism

Major Goals: To develop and display respect, compassion, and integrity in all interactions with patients, families, and other health professionals.

Objectives:

Skill Level I

- Demonstrate respect, compassion and integrity when dealing with patients, colleagues and staff.
- Perform duties in a dependable and responsible manner.

Skill Level II

- Participate in an accreditation inspection of a laboratory related to TM (either official or unofficial). (PR, SBP, IC)
- Participate in Quality Assurance activities that improve laboratory services or patient care. (PR, SBP)

Skill Level III

- Demonstrate understanding of the role of peer-review as required by the department, UCDMC, JCAHO and AABB standards. (PR, SBP, IC)
- Support advancement of the profession through personal action and professional organizations. (PR)
• Demonstrate familiarity with the scientific, legal, and ethical issues surrounding allocation of resources, cost containment and the role of gatekeeper. (PR, PBL, IC, SBP)
• Demonstrate familiarity with ethical issues in BB and TM (e.g. confidentiality as it relates to blood donor or recipient, HIV testing and reporting, the patient’s right to refuse transfusion, the use of hematopoietic growth factors in normal donors and informed consent). (PR, PC)
• Advocate for high quality care regardless of the race, ethnicity, gender, sexual orientation or socioeconomic status of the patient. (PR, SBP, IC)

**System-Based Practice**

**Major Goals:** To learn to work with the medical system to provide optimal care.

**Objectives:**

*Skill Level 1*

- Demonstrate familiarity with UCDMC patient care standards and policies. (SBP)
- Demonstrate familiarity with UCDMC incident reporting system. (SBP)
- Participate in QA conferences and activities. (SBP)

*Skill Level II*

- Demonstrate familiarity with the requirements of all applicable regulatory and accrediting agencies (JCAHO, AABB, FDA, CAP, CA-DHHS). (SBP)
- Demonstrate knowledge of how to host an inspection by an accrediting agency (SBP, IC, PR)

*Skill Level III*

- Compare various methods of performing blood utilization review, prospective retrospective. (SBP)
- Demonstrate ability to perform a lookback investigation. (SBP, IC)
- Demonstrate ability to write an error or deviations report, do a root cause analysis, create corrective or preventative action plan and, if indicated, report to FDA. (SBP, IC, PBL)
- Demonstrate familiarity with the relevant regional plan for major disasters and explain the roles of the local blood supplier and the transfusion service or blood bank in this plan. (SBP, IC)
2. **Apheresis and Progenitor Cell Collection and Processing Training**

**Patient Care**

**Major Goals:** Understand and apply the principles of Apheresis Medicine in diverse populations of patients and donors.

**Objectives:**

*Skill Level I*

- Demonstrate the ability to assess the appropriateness of apheresis for patient’s condition by reviewing the medical history and history of present illness. (PC, PBL)
- Demonstrate the ability to assess the patient’s physical condition prior to apheresis by evaluating vital signs, lab tests, and abbreviated history and physical exam. (PC, PBL)

*Skill Level II - III*

- Demonstrate the ability to recognize emergent apheresis needs and triage apheresis requests. (PC, PBL)
- Demonstrate ability to recognize and manage apheresis related complications. (PC)
- Demonstrate proficiency in treating patients with specialized apheresis methods (e.g. photopheresis) (PC, MK)
- Demonstrate proficiency in evaluating, assessing, and treating a wide variety of patients who require therapeutic apheresis for various disorders. (MK, PC, IC, PR)
- Demonstrate proficiency in writing physician orders for peripheral blood HSC collections and obtaining consent for the procedure and for blood product transfusion, if needed after the collection {PC, MK, IC, PR}.
- Demonstrate proficiency in evaluating and treating adverse reactions associated with peripheral blood progenitor cell (PBPC) collection {PC, MK}.

**Medical Knowledge**

**Major Goals:** Know the scientific and medical principles that guide current Apheresis Medicine practice.

**Objectives:**

*Skill Level I-II*

- Understanding the role of apheresis for blood product acquisition and for therapy. (MK)
- Demonstrate knowledge of the major indications for therapeutic apheresis including the category of evidence for each of these indications as outlined by AABB/ASFA. (MK, PC)
- Summarize the principles of apheresis technology, including centrifugation, filtration and immunoabsorption. (MK)
- Demonstrate knowledge of the appropriate replacement fluids and blood products to be used in an apheresis procedure. (MK, PC)
• Demonstrate knowledge of vascular access requirements for therapeutic apheresis and Peripheral Blood Stem Cell Collections (PBSC). (MK, PC)
• Demonstrate knowledge of stem cell mobilization protocols and the side effects of BM stimulation. (MK, PBL)
• Demonstrate knowledge of the principles of HSC transplantation, including collection, processing, and storage of these products, and the indications for use (e.g., marrow, peripheral blood, and placental and/or umbilical cord blood) (MK, SP, PC).

Skill Level II-III

• Demonstrate ability to review quality control data from the collecting, processing, and storage of individual HSC products and actions needed when product or processing irregularities are identified (MK, SP, PC).
• Demonstrate familiarity with emerging areas of cellular therapy, including hematopoietic graft engineering and cellular immunotherapeutics (MK, PL, PC).

Practice-Based Learning

Major Goals: Demonstrate process for ongoing acquisition of transfusion medicine knowledge & skills based on experiences with apheresis of patients & donors.

Objectives:

Skill Level I-II

• Locate, appraise and assimilate evidence from scientific studies related to their patients’ health problems
• Use information technology to optimize learning
• Use eLibrary/CRC resources to evaluate blood requests.
• Demonstrate ability to work independently as experience with apheresis increases. (PBL)
• Demonstrate ability to triage requests for therapeutic apheresis. (PBL, IC)

Skill Level III

• Demonstrate the ability to evaluate the literature describing the use of therapeutic apheresis in particular disorders for which data suggesting efficacy is limited and to develop an effective plan of care with the clinical team. (PBL, MK)

Interpersonal Communication Skills

Major Goals: Develop the skills necessary to cultivate a good working relationship with other physicians, health care professionals, the patients and their families.

Objectives:

Skill Level I

• Demonstrate progressive ability in evaluating and preparing patients for therapeutic apheresis, including obtaining consent for the procedure and for transfusion of blood products during the procedure. (IC, PC, PR)
• Communicate effectively with attending clinicians and house staff regarding emergent and scheduled therapeutic apheresis using conversations and consult notes. (IC, PR)

**Skill Level II-III**

• Begin to write appropriate physician orders for therapeutic apheresis procedures utilizing a standardized template or blank physician order sheets specifying blood volume to be processed during apheresis, replacement fluid to be used, anticoagulation to be used, and appropriate lab testing (if any). (IC, PC)
• Demonstrate the ability to write progress notes that communicate the patient’s response to the procedure and the efficacy of therapy. (IC, PC)
• Demonstrate the ability to discuss the results of the procedure with the consulting physician, including the necessity for additional procedures. (IC, PC, PR)

**Professionalism**

**Major Goals:** Demonstrates respect, compassion, and integrity to patients, families, and other health professionals.

**Objectives:**

**Skill Level I-III**

• Show respectful interactions with patients and other health care professionals.(PR, IC)
• Demonstrate commitment to ethical principles pertaining to providing apheresis treatments, including confidentiality, and informed consent.(PR, PC)
• Demonstrate sensitivity with regard to cultural, gender, sexual orientation and disability issues. (PR, PC)

**System-Based Practice**

**Major Goals:** Works with the medical system to provide optimal care.

**Objectives:**

**Skill Level I-III**

• Demonstrate knowledge of the indications for apheresis and HPC collection.(SBP, MK)
• Participate in quality assurance and patient safety initiatives.(SBP, PBL)
• Demonstrate understanding of the elements of current good manufacturing practices and current good tissue practices as they apply to the collection, processing, ex vivo manipulation, and storage of all cellular therapy products (e.g., pancreatic islet cells, negative and/or positive selection and/or purging of HSCs, gene manipulation, donor lymphocyte infusions, dendritic cell vaccines, ex vivo expansion of progenitor cells) {MK, SP, PC}
• Demonstrate familiarity with standards and regulations that apply to clinical tissue banks, and PBPC processing laboratories (FDA, AABB, FACT, CAP). (MK, SP, PC)
3. Hematopathology Training: Automated Hematology, Peripheral Blood Smears and Coagulation

Patient Care

Major Goals: To appropriately utilize hematology and coagulation testing in the clinical evaluation and management of patients and donors.

Objectives:

Skill Level I

- Review a patient’s medical record and extract information relevant to the diagnostic process: chief complaint, signs & symptoms, radiographic studies, diagnostic procedures, therapeutic interventions.
- Describe the components of a CBC including the indices and the patient information provided by each.
- Describe Interferences in CBC testing: What they affect, why they effect and how we get around them
  - WBC: High counts, cryoproteins
  - RBC and indices: cold agglutinins, hyperglycemia
  - HGB: icterus, lipemia, high WBC
  - PLT: small rbc’s, shistocytes large platelets, plt clumps, etc
- Examine a peripheral blood smear and identify normal structures.
- Describe proper preparation and handling of blood smears.
- Illustrate Manual review criteria and flagging of histograms.
- Examine coagulation & fibrinolytic screening test results and identify abnormalities that relate to the patient’s disease process in the bleeding, thrombophilic or anticoagualted patient.
- Examine platelet function test results and identify abnormalities that relate to the patient’s disease process in the bleeding, thrombophilic or anticoagulated patient.
- Discuss the various methods of testing for coagulopathy and thrombophilia, and correlate the test abnormalities with the clinical condition of the patient.

Skill Level II

- Examine a peripheral blood smear, identify abnormalities and formulate a differential diagnosis based on the findings.
- Discuss the differential diagnosis of TTP, HUS, aHUS, DIC and other causes of microangiopathic hemolytic anemia.
- Discuss the clinical presentation of, therapy for and monitoring of congenital bleeding disorders including the Hemophilias, vonWillebrands disease, Thrombocytopathies, and other bleeding disorders.
- Discuss the clinical presentation of, therapy for, and monitoring of acquired bleeding disorders including trauma, liver disease, renal disease, sepsis, factor inhibitors, envenomation and amyloidosis.
• Summarize the clinical implications of screening tests including prothrombin time (PT), international normalized ratio (INR), activated partial thromboplastin time (aPTT), mixing studies, fibrinogen, D-dimer, and PFA-100.
• Discuss the indications for esoteric testing including factor assays, inhibitor assays, and platelet aggregation studies and the therapeutic options for the associated disorders.
• Discuss the appropriate use of molecular tests in the evaluation of thrombophilia: Factor V Leiden, Prothrombin 20210G mutation, and Methylene tetrahydrofolate reductase mutation.
• Outline the use of the following tests for evaluation of thrombophilia: Protein C, Protein S, Antithrombin, Factor VIII, von Willebrand factor, Fibrinogen, Plasminogen Activator Inhibitor, Activated Protein C Resistance (APC resistance).
• Discuss the laboratory diagnosis of arterial thrombosis related to Antiphospholipid antibody syndrome including Anticardiolipin antibody, Anti-beta2 glycoprotein I antibody, and Lupus anticoagulant.
• Discuss anticoagulant therapy, monitoring and reversal for heparin, LMWH, UFH, DTI and anti-platelet drugs ASA & P2Y12.
• Identify the problems with INR monitoring, specifically, use of Lab vs POCT methodology, Lupus Anticoagulants and concomitant drug therapy and the predictive value of INR for surgical bleeding.
• Summarize the work-up of Heparin induced thrombocytopenia including Pre-test probability assessment, Lab testing, SRA vs ELISA, Confirmation testing principles, and Post-test probability assessment.
• Describe the principles of direct thrombin inhibitor anticoagulation including the Monitoring with aPTT vs ECT and problems with DTI or Resistance with antibody formation
• Describe the principles of fibrinolytic therapy including the Drugs, monitoring, and effects on coagulation tests.
• Discuss the principles of anti-fibrinolytic therapy including drugs, monitoring, and the effects on coagulation tests.

Medical Knowledge

Major Goals: To understand the pathophysiology and principles of laboratory diagnosis of blood diseases, hemostasis and thrombosis.

Objectives:

Skill Level I

• Discuss the principles of operation for the CBC instrument including electrical impedance, cell counting, hemoglobin/hematocrit measurements or calculations, corrected WBC, nucleated RBC measurement and reticulocyte counting.
• Discuss patient, pre-analytic, analytic and post analytic variables that can alter CBC findings.
• Compare Manual vs auto WBC and PLT counts as well as microHct techniques
• Limitations of auto and manual counts
• Identify peripheral smear artifacts in WBC, RBC, and PLT morphology.
• Identify the normal elements of the coagulation and fibrinolytic pathways
• Demonstrate knowledge of the instruments and methods used to test coagulation
• Identify normal platelet morphology and functionality
• Describe the methods used to test platelet function
Skill Level II-III

- Articulate a plan for evaluation of abnormalities found on the CBC or peripheral blood smear.
- Explain the Erythrocyte Sedimentation Rate, theory and clinical utility
- Describe the basic coagulation cascade including Cellular components, Endothelium, Platelets, White blood cells, Red Blood cells, Plasma components, Procoagulants, Regulators and contrast the Waterfall vs in-vivo cascade.
- Demonstrate knowledge of chromogenic assays and Immunoassays including LIA, ELISA, and RID/ID.
- Discuss Platelet aggregation studies using Platelet rich plasma or whole blood and Rapid testing (e.g. PFA-100).
- Demonstrate knowledge of Point-of-care coagulation tests including Screening tests and Clot signatures and TeG.
- Principle and derivation of ISI and calculation of INR.

Problem-Based Learning

Major Goals: To develop a process for assimilation and improvement of knowledge and skill regarding interpretation of hematologic tests and their application to clinical care.

Objectives:

Skill Level I-III

- Locate, appraise and assimilate evidence from scientific studies related to their patients’ health problems
- Use information technology to optimize learning
- Demonstrate Use of the Cellavision for finding and transmitting images of abnormal cells - overview and login
- Use eLibrary/CRC resources to evaluate any unusual lab request
- Demonstrate ability to review abnormal histogram results and correlate results with peripheral blood smear findings.
- Locate, appraise and assimilate evidence from scientific studies related to their patients’ health problems
- Use information technology to optimize learning
  1. Describe how CLSI and CAP recommendations impact the laboratory management of anticoagulation

Interpersonal Communication

Major Goals: Develop a good working relationship with other physicians, health care professionals, and patients

Objectives:

Skill Level I-III
- Write timely, clear and concise reports based on hematology and coagulation test results.
- Communicate effectively with physicians, other health professionals, and health related agencies
- Maintain comprehensive, timely, and legible medical records

**Professionalism**

**Major Goals:** Demonstrates respect, compassion, and integrity to patients, families, and other health care professionals

**Objectives:**

*Skill Level I-III*

- Compassion, integrity, and respect for others
- Accountability to patients, society, and the profession

**System-Based Practice**

**Major Goals:** Work with the medical system to provide optimal care and appropriate use of blood products in the care of bleeding patients.

**Objectives:**

*Skill Level I-III*

- Work in interprofessional teams to enhance patient safety and improve patient care quality
- Participate in identifying systems errors and in implementing potential systems solutions
4. Blood Center, Immunohematology Reference Lab, and HLA

Patient Care

Major Goals:

- Understand all major blood banking and transfusion medicine issues affecting donor populations.
- Understand the need for advanced testing and is able to review and interpret the test results.
- Interpret HLA test results and their medical implication.

Objectives:

Skill Level I

- Observe and subsequently demonstrate competency in performing a donor interview and exam, including obtaining consent to donate (e.g., discuss risks, benefits, alternatives, and answer questions) (PC, IC, PR).
- Demonstrate familiarity and proficiency in evaluating and treating adverse reactions associated with blood donation and/or phlebotomy (both whole-blood and apheresis donations) (PC, PR, MK).
- Demonstrate knowledge of the techniques of safe, sterile venipuncture and the associated methods to reduce bacterial contamination of products (PC, MK).
- Discuss the principles of HLA matching in solid organ and hematopoietic stem cell transplantation. (PC, MK)
- Discuss the role of HLA antibodies in transplantation, particularly in organ rejection. (PC, MK)
- Discuss the role of platelet crossmatching and HLA matching in platelet transfusion. (PC,MK)
- Interpret PRA for Class HLA I and II antibody detection.

Skill Level II-III

- Outline the necessary steps in donor notification and counseling associated with positive infectious disease testing results and the donor lookback process (PC, SP, IC).
- Demonstrate knowledge of post-transplant monitoring including allore cognition and antibody detection. (PC, MK)

Medical Knowledge

Major Goals:

- Know the scientific and medical principles that guide the current evaluation of donor eligibility.
• Know the scientific and laboratory testing principles of the advanced testing.

• Know the scientific and medical principles that HLA testing.

Objectives:

Skill Level I

• Demonstrate knowledge of the current FDA regulations and AABB requirements that are used to determine the suitability of blood donors. (MK)
• Demonstrate knowledge of the advantages and disadvantages of directed blood donation and limited donor exposure programs (PC, MK, SP).
• Compare and contrast the eligibility requirements for allogeneic and autologous blood donations (MK).
• Demonstrate knowledge of the indications for therapeutic phlebotomy (MK).
• Outline the assay principles (e.g., nucleic acid testing, enzyme-linked immunororbent assay) of required donor blood tests and associated confirmatory testing and describe examples of donor reentry algorithms (MK, SP)
• Describe the structure and function of MHC and HLA systems and discuss the roles of diversity, polymorphism and evolution in MHC. (MK)
• Demonstrate knowledge of the disease associations of HLA types (MK)
• Demonstrate knowledge of HLA testing, molecular approaches and cellular assays. (MK)

Skill Level II

• Demonstrate familiarity with specialized antibody testing techniques including enzyme treatment/CDP/ZZAP/DTT/2ME/AET/acidification treatment and absorption/elution. (MK, PC)
• Demonstrate knowledge of the principles of specialized immunohematology testing including lectin testing, neutralizations, secretor studies, red cell survival studies, Donath-Landsteiner testing, and drug induced hemolytic anemia studies. (MK, PC)
• Compare & contrast Cytotoxicity, luminex, flow cytometry, molecular methods for HLA testing.

Skill Level III

• Describe principle and utility of autologous neocyte recovery by microhematocrit centrifugation (MK)
• Discuss polyagglutination including the clinical implications of the problem and the resolution of the laboratory problems (MK)
• Discuss the significance and identification of HTLA antibodies. (MK)
• Describe the Matuhasi-Ogata phenomena and its clinical significance. (MK)

Practice Based Learning

Major Goals:

• Demonstrate process for ongoing acquisition of transfusion medicine knowledge & skills based on experiences with Blood Banking cases.
• Understand basic regulatory issues regarding advanced laboratory testing.

• Demonstrate process for ongoing acquisition of transfusion medicine and cellular therapy knowledge & skills.

**Objectives:**

**Skill Level I**

- Demonstrates familiarity with reliable journals, texts and web based resources that may be utilized to learn from patient case-based problems. (PBL)
- Demonstrate proficiency in evaluating patients refractory to platelet transfusions, including the clinical evaluation as well as the principles of histocompatibility testing and the roles of HLA matched vs. crossmatched platelets. Apply this knowledge by selecting appropriate platelet products when indicated. (PBL)

**Skill Level II**

- Demonstrate awareness of current concerns about emerging infections, and describe how the blood collection centers deal with these concerns (MK, PBL).
- Utilize the knowledge gained from monitoring an HLA sensitized patient to develop preventative strategies for similar patients. (PBL)

**Skill Level III**

- Participate in quality review of the manufacturing or processing of products (PL).

**Interpersonal Communication**

**Major Goals:**

- Develops a good working relationship with other physicians, health care professionals, blood donors, and patients.

- Develops an excellent relationship with other scientists, physicians, health care professionals, and patients.

**Objectives:**

**Skill Level I**

- Demonstrate an understanding of basic computer science as related to blood banking and communications (IC)
- Begin to write appropriate Blood Bank Consultations that communicate the patient's problem and the plan for transfusion therapy.
- Demonstrate ability to communicate laboratory testing results, transfusion recommendations, and blood supply issues to clients, both verbally and in written or electronic form. (IC, SBP, PC)
- Attend didactics, laboratory meetings; sustain final presentation.
Skill Level II-III

- Demonstrate an understanding of blood center information systems, their required safety features, deployment issues and validation. (IC, SBP)

**Professionalism**

**Major Goals:**

- Demonstrates respect, compassion, and integrity to blood donors, patients, families, and healthcare professionals.

- Demonstrates respect and integrity in working with other health professionals, laboratory and administrative personnel.

**Objectives:**

**Skill Level I**

- Demonstrate professionalism in interactions with prospective donors (PR, IC).
- Treat transfusion medicine affiliated specialists with respect for their specialized knowledge and skills. (PR)
- Demonstrate familiarity with ethical issues in BB and TM (e.g. confidentiality as it relates to blood donor or recipient, HIV testing and reporting, the patient’s right to refuse transfusion, the use of hematopoietic growth factors in normal donors and informed consent). (PR)

**Skill Level II**

- Demonstrate understanding of medical economics as applied to the practice of Transfusion Medicine. (PR, SBP)
- Demonstrate understanding of the role of professional and accrediting organizations, CAP and AABB, in maintaining quality and safety in Transfusion Medicine. (PR, SBP)

**Skill Level III**

- Demonstrate understanding of how leadership and management skills contribute to the delivery of cost-effective patient care. (PR, SBP)

**System Based Practice**

**Major Goals:**

- Works with the medical system to provide optimal care and service.

- Works with the research systems available to provide appropriate care.
Objectives:

Skill Level I

- Demonstrate familiarity with the steps in blood component and blood derivative preparation (MK, SBP).
- Describe the factors that influence the motivation of blood donors (MK, SBP).
- Demonstrate an understanding of the basic principles and tactics of marketing. (SBP)
- Participate in quality review of blood component collection, manufacturing, and processing, processes.

Skill Level II

- Demonstrate understanding of, and the ability to interpret, the major regulations and guidelines applicable to collection, processing, storage, and release of blood products and cellular therapy products (SBP, MK).
- Demonstrate familiarity with the operational logistics required to determine appropriate blood inventory for a geographic region and the process of meeting daily, weekly, and monthly collection goals (SBP, IC).
- Demonstrate a basic working knowledge of accounting, finance and economics as they relate to blood center or laboratory operations. (SBP)

Skill Level III

- Demonstrate understanding of the elements of current good manufacturing practices as they apply to the collection, processing, ex vivo manipulation, and storage of all blood products (MK, SP, PC)
- Demonstrate familiarity with standards and regulations that apply to blood collection centers, clinical tissue banks, and PBPC processing laboratories (FDA, AABB, FACT, CAP). (MK, SP, PC)
- Demonstrate knowledge of circumstances where deviations can be approved, who can approve and the documentation needed for granting deviations. (SBP)
- Participate in event reporting analysis and quality audits. (SBP)
- Demonstrate familiarity with quality systems as they apply to blood collection centers (i.e., AABB Quality System Essentials, ISO 9000, lean manufacturing, Six Sigma) (SP, PL)
- Demonstrate familiarity with requirements and procedures for source plasma donors (MK, SP, PC).
- Demonstrate understanding of how global forces in health & medicine affect the delivery of health care (SBP, PR).