Educational Goals of Residents rotation in Transfusion Medicine

Educational Goals

The goal of the training program in Transfusion Medicine at Columbia University Medical Center and the College of Physicians and Surgeons of Columbia University is to provide the finest training of physicians in the fields of blood banking, apheresis, cellular therapy, and coagulation. Transfusion Medicine Residents will receive outstanding training as how to provide comprehensive consultative services for blood component selection, apheresis procedures, and peripheral blood collection and processing. This is made possible by the very active clinical services that provide over 80,000 units of blood and blood products per year, while performing over 2,000 procedures in the apheresis/hemotherapy unit on outpatients and inpatients diagnosed with a variety of hematopoietic, immunologic, oncologic, neurologic, and genetic disorders. The training is very “hands on” with the resident assuming as much responsibility as is appropriate for his/her level of training and demonstrated ability; faculty instructions and close supervision are always present, but as non-obstructive as possible. The resident is the primary interface of the department with clinical services.

Evaluation

Evaluations will be performed monthly by a written and verbal performance evaluation by the program director with input from the course directors. A case log will be kept for all clinical cases.

Educational Activities

Attendance at clinical, didactic and research conferences is expected.

- Attendance at Morning and Afternoon Clinical Rounds
- Chief of Service Rounds
- Attendance at Hematology Oncology Rounds
- Didactic Sessions as appropriate
- Special Topics in Laboratory Medicine Conference
- Transfusion Medicine Case of the Week
- Alloantibody and Transfusion Reaction Signout Rounds

Clinical Services Rotations

1. Transfusion Service
   1.1 Patient Care
      1.1.1 Pretransfusion Testing
         1.1.1.1 Demonstrate the ability to interpret ABO blood types and ABO discrepancies
         1.1.1.2 Demonstrates the ability to identify clinically significant and clinically insignificant red cell alloantibodies on red cell
antibody panels, appropriately outlines the transfusion management for the patient, and communicates this to the blood bank and clinician either verbally or written form

1.1.3 Demonstrates the ability to recognize serologic cases that are more appropriately handled by a reference laboratory

1.1.4 Demonstrates the ability to choose appropriate crossmatching methods depending on serologic findings

1.1.5 Demonstrates the ability to interpret the results of a direct Antiglobulin test and how to evaluate immune-mediated red cell destruction (e.g. warm autoimmune hemolytic anemia). Demonstrates how to appropriately treat, including transfusing red cells, in patients with immune and non-immune mediated hemolytic anemias.

1.1.2 Transfusion Services

1.1.2.1 Demonstrates the ability to choose appropriate blood components (e.g. RBCs, FFP), blood component modifications (e.g. irradiated), special blood components (e.g. granulocytes), and blood derivatives or recombinants (e.g. Humate-P, Novoseven) based on a thorough knowledge of the clinical situation and the component indications. This includes platelet refractoriness, alloimmune thrombocytopenia

1.1.2.2 Demonstrates the ability to appropriately diagnose and manage perinatal and neonatal transfusion problems such as hemolytic disease of the newborn, neonatal alloimmune thrombocytopenia, maternal Rh immunoglobulin administration.

1.1.2.3 Demonstrate the ability to evaluate a suspected transfusion reaction, order and interpret appropriate laboratory tests, and provide consultation on the etiology and management of future transfusions.

1.1.2.4 Demonstrate the ability to manage the blood inventory, communicate the blood bank needs to the blood suppliers, and appropriately manages blood utilization during periods of shortages of blood components and types, and audits the appropriateness of blood component orders falling outside of blood bank transfusion guidelines.

1.1.2.5 Demonstrates the ability to perform look back investigations and counsel physicians on the etiology, screening, and risk of transfusion-transmitted infectious diseases.

1.1.3 Regulatory

1.1.3.1 Demonstrate familiarity with the requirements of all applicable regulatory and accrediting agencies (e.g. JCAHO, CAP, AABB, FDA, FACT) and demonstrates the ability to perform a

1.1.3.2 Demonstrate ability to write an error report in the Medical Error Reporting System – Transfusion Medicine (MERS-TM), perform a root cause analysis, and implement a corrective action plan.
1.2 Knowledge

1.2.1 Demonstrates knowledge of blood group genetics and blood group antigens and the methods to detect blood group antigens

1.2.2 Demonstrates knowledge of red cell antigen and allo- and autoantibodies interactions and the methods to detect these interactions as it pertains to practical blood banking

1.2.3 Demonstrates knowledge of molecular biology as it applies to transfusion medicine

1.2.4 Demonstrates knowledge of the HLA system in transfusion medicine

1.2.5 Understands platelet and granulocyte antibodies and antigens

1.2.6 Understands the properties of each blood component or blood derivative and the appropriate use of the components

1.2.7 Understands transfusion issues for patients undergoing solid organ transplantation

1.3 Practice Based Learning and Improvement

1.3.1 To locate, appraise and assimilate evidence from scientific studies related to the division cases to obtain and use information from the division experience and the larger population from which specimens and cases are drawn.

1.4 Interpersonal and Communication Skills

1.4.1 learn to function as a laboratory consultant to the clinical physicians, which includes:

1.4.1.1 communicating accurately the results of the laboratory and clinical evaluation and the diagnostic conclusions and management recommendations

1.4.2 developing the skills of presenting the results of all studies to the clinicians at a clinicopathologic conference.

1.4.3 Professionalism

1.4.3.1 Demonstrates active participation in all function of the transfusion medicine service and reliability performs the duties

1.4.3.2 Demonstrates dedication to patient’s care, academics, and teaching

1.4.3.3 Maintains good relationships with laboratory and clerical personnel, nurses, managers, supervisors, and with attendings and with other fellows and residents.

1.5 Systems

1.5.1 Demonstrate the ability to develop new policies and procedures or change existing policies and procedures based on a review of the literature or issuance of new guidelines by regulatory agencies

1.5.2 Demonstrate familiarity with quality systems as they apply to blood banking (e.g. FDA, CAP, AABB, FACT, JCAHO)

1.5.3 Develop an understanding of the organization and function of the different sections of the transfusion medicine

1.5.4 To develop an understanding of quality assurance and quality control issues (see Regulatory)
2. Blood Collections

2.1 Patient and Donor Care

2.1.1 Perform an autologous and allogeneic donor interview and exam, including obtaining consent to donate (risks, benefits, alternatives, answer questions)

2.1.2 Demonstrate proficiency in evaluating and treating adverse reactions associated with blood donation (whole blood and apheresis donations)

2.1.3 Write appropriate physician orders for peripheral blood hematopoietic stem cell collections and obtain consent (risk, benefits, alternatives, answer questions) for the procedure and for blood product transfusion if needed following the collection

2.1.4 Demonstrate proficiency in evaluating and treating adverse reactions associated with peripheral stem cell collections

2.1.5 Demonstrates proficiency in the evaluation and clinical recommendations for transfusion in patients with difficult serologic problems

2.2 Medical Knowledge

2.2.1 Demonstrate knowledge of current donor eligibility criteria for allogeneic, autologous and directed blood and apheresis donors

2.2.2 Outline the assay principles (e.g. NAT, ELISA, etc) of required donor blood tests, confirmatory testing, risk of transfusion transmitted disease, donor notification, look-back procedures and donor re-entry criteria

2.2.3 Demonstrates knowledge of the risk of bacterial contamination of blood products and the current and developing methods that may reduce bacterial contamination from venipuncture to time of issue of products during venipuncture

2.2.4 Demonstrate familiarity with the “manufacturing” and corporate operations of a blood center

2.3 Practice Based Learning and Improvement

2.3.1 To locate, appraise and assimilate evidence from scientific studies to obtain information on the current and future practices of blood collection

2.4 Interpersonal and Communication Skills

2.4.1 Learn to function as a consultant to blood collection center administration and blood bank physicians and staff (client), which includes:

2.4.1.1 Communicating accurately the results of the laboratory and clinical evaluation and the diagnostic conclusions and management recommendations of donor lookback and blood component and derivative use

2.4.1.2 Communicating clearly the scientific agenda for future medical decision regarding blood donor history and testing

2.4.2 Professionalism
2.4.2.1 Demonstrates active participation in all function of the blood collection medical service, reference laboratory and operations reliability and performs all duties
2.4.2.2 Demonstrates dedication to patient and donor care
2.4.2.3 Maintains good relationships with administration of blood collection center, laboratory and clerical personnel at the blood center and client blood banks, and with attendings and with other fellows in the program.

2.5 Systems
2.5.1 Demonstrate the ability to develop new policies and procedures or change existing policies and procedures based on a review of the literature or issuance of new guidelines by regulatory agencies
2.5.2 Demonstrate familiarity with quality systems as they apply to blood banking and collections (e.g. FDA, CAP, AABB, NYSDOH)
2.5.3 Develop an understanding of the organization and function of the different sections of the corporate and operations

3. Therapeutic Apheresis
3.1 Patient Care
3.1.1 Demonstrate proficiency in evaluating and preparing patients for therapeutic apheresis, writing appropriate orders, obtaining consent (risks, benefits, alternatives, answer questions) for the procedure and for transfusion of blood products during the procedure
3.1.2 Demonstrates proficiency of 3.1.1 in a pediatric population
3.1.3 Demonstrate ability to triage requests for therapeutic apheresis given limited resources
3.1.4 Demonstrate proficiency in evaluating and treating adverse reactions associated with therapeutic apheresis

3.2 Knowledge
3.2.1 Summarize the principles of apheresis technology, including centrifugation, filtration, photopheresis, and immunoadsorption
3.2.2 Demonstrate knowledge of the indications for therapeutic apheresis and the technical aspects of the appropriate procedure to be used in various situations
3.2.3 Demonstrate knowledge of vascular access requirements and management of intravenous access

3.3 Practice Based Learning and Improvement
3.3.1 To locate, appraise and assimilate evidence from scientific studies related to the division cases to obtain and use information from the division experience and the larger population from which cases are drawn.

3.4 Interpersonal and Communication Skills
3.4.1 learn to function as a consultant to the clinical physicians, which includes:
3.4.1.1 communicating accurately the results of the laboratory and clinical evaluation and the diagnostic conclusions and
management recommendations for patients requiring apheresis

3.4.1.2 communicates accurately the management plan to nursing staff in the hemotherapy unit

3.4.2 developing the skills of presenting the results of all studies to the clinicians at a clinicopathologic conference.

3.4.3 Professionalism

3.4.3.1 Demonstrates active participation in all function of the transfusion medicine service and reliability performs the duties

3.4.3.2 Demonstrates dedication to patient’s care, academics, and teaching

3.4.3.3 Maintains good relationships with laboratory and clerical personnel, nurses, managers, supervisors, and with attendings and with other fellows and residents.

3.5 Systems

3.5.1 Demonstrate the ability to develop new policies and procedures or change existing policies and procedures based on a review of the literature or issuance of new guidelines by regulatory agencies

3.5.2 Demonstrate familiarity with quality systems as they apply to blood banking (e.g. FDA, CAP, AABB, FACT, JCAHO)

3.5.3 Develop an understanding of the organization and function of the different sections of the transfusion medicine

3.5.4 To develop an understanding of quality assurance and quality control issues (see Regulatory)
4. Transfusion Medicine Resident Goals in Cellular Therapy

4.1 Patient Care
4.1.1 Demonstrate proficiency in the evaluation and assessment of autologous donors and the donor evaluation and eligibility criteria for allogeneic donors
4.1.2 Demonstrates the appropriate management of HPC mobilization medications (G-CSG, GM-CSF, AMD3100) for patients or donors undergoing hematopoietic stem cell mobilization and collection.
4.1.3 Appropriately consults on the management of poor mobilizers.
4.1.4 Follow at least one stem cell recipient longitudinally, from pre-collection evaluation, through collection, transplantation, and follow-up clinic visits (preferably at least one pediatric and one adult patient should be followed).
4.1.5 Follows the processing and thaw/infusion of cord blood, peripheral blood HPCs with and without CD34 selection, and bone marrow
4.1.6 Follows the cryopreservation of HPC products
4.1.7 Appropriately selects blood components for transfusion in patients who receive ABO incompatible HPC transplants

4.2 Knowledge
4.2.1 Understands the diseases that are treated with autologous and allogeneic HPC transplantation.
4.2.2 Demonstrates knowledge of the sources of HPC and other cellular therapies
4.2.3 Demonstrates the knowledge of the collection and transplant of HPCs from cord blood
4.2.4 Understands the theory of cryopreservation
4.2.5 Understands the pathophysiology, diagnosis and management of graft versus host disease
4.2.6 Demonstrates knowledge of tests for following chimerism
4.2.7 Understands the flow cytometric techniques for CD34+ cell enumeration
4.2.8 Understands the laboratory techniques for HLA typing

4.3 Practice Based Learning and Improvement
4.3.1 To locate, appraise and assimilate evidence from scientific studies related to the division cases to obtain and use information from the division experience and the larger population from which products and cases are drawn.

4.4 Interpersonal and Communication Skills
4.4.1 learn to function as a laboratory consultant to the clinical physicians, which includes:
4.4.1.1 communicating accurately the results of the laboratory and clinical evaluation and the diagnostic conclusions and management recommendations
4.4.2 developing the skills of presenting the results of all studies to the clinicians at a clinicopathologic conference.

4.4.3 Professionalism
4.4.3.1 Demonstrates active participation in all function of the transfusion medicine service and reliability performs the duties

4.4.3.2 Demonstrates dedication to patient’s care, academics, and teaching

4.4.3.3 Maintains good relationships with laboratory and clerical personnel, nurses, managers, supervisors, and with attendings and with other fellows and residents.

4.5 Systems

4.5.1 Demonstrate the ability to develop new policies and procedures or change existing policies and procedures based on a review of the literature or issuance of new guidelines by regulatory agencies

4.5.2 Demonstrate familiarity with quality systems as they apply to blood banking (e.g. FDA, CAP, AABB, FACT, JCAHO)

4.5.3 Develop an understanding of the organization and function of the different sections of the transfusion medicine

4.5.4 To develop an understanding of quality assurance and quality control issues (see Regulatory)

5. Coagulation

5.1 Patient Care

5.1.1 Interpret results of mixing studies to guide further coagulation testing

5.1.2 Interpret results of tests involved in the identification of lupus anticoagulant and antiphospholipid antibody syndromes

5.1.3 Interpret results of Bethesda assays for factor inhibitors

5.1.4 Interpret results of coagulation tests in the setting of fibrinolytic therapy

5.1.5 Interpret results of Heparin Induced Thrombocytopenia testing (ELISA tests vs serotonin release assay/platelet aggregation studies) in the appropriate clinical context

5.1.6 Interpret platelet function studies including platelet aggregation studies, bleeding time, and screening studies, such as the PFA and other “in vitro” bleeding times.

5.1.7 Recognize platelet function abnormalities associated with acquired thrombocytopenias: aspirin, Plavix, GPIIb-IIIa antagonists

5.1.8 Recognize platelet function abnormalities associated with congenital thrombocytopenias (thrombasthenia, Bernard Soulier Syndrome, Storage Pool Disease)

5.1.9 Interpret studies performed for the evaluation of vWD

5.1.10 Interpret results of tests measuring components of the fibrinolytic system

5.1.11 Interpret results of tests for thrombotic risk factor identification: Protein C, S, ATIII, and Activated Protein C Resistance
5.2 **Knowledge**

5.2.1 Understand the principles of routine coagulation analysis (PT, APTT, fibrinogen, Thrombin Time)

5.2.2 Understand the effect of hematocrit and blood drawing technique on anticoagulation of blood sample for coagulation testing

5.2.3 Understand the INR derivation and its clinical significance*

5.2.4 Understand the principle of tests involved in monitoring heparins (unfractionated vs LMW): APTT, anti Xa activity

5.2.5 Understand the method of action of direct thrombin inhibitors and their effect on coagulation testing

5.2.6 Understand the pathophysiology of Vit K deficiency or antagonism and appropriate laboratory monitoring tests

5.2.7 Develop basic understanding of hemostatic and thrombotic disorders

5.2.8 Understand the coagulopathy of liver disease

5.2.9 Understand the laboratory evaluation of DIC*

5.2.10 Understand the pathophysiology of the hemophilias (A B, C)

5.2.11 Understand the principles of molecular analysis of thrombotic risk factors (Factor V Leiden, Prothrombin G20210A, MTHFR)

5.2.12 Understand the principle of clot based and chromogenic coagulation factor assays, and recommend their appropriate use

5.2.13 Recognize the effect of circulating anticoagulants on coagulation testing, and recommend appropriate follow-up clinical and laboratory follow-up

5.2.14 Understand the pathophysiology leading to the three major vWD subtypes and expected laboratory results

5.2.15 Discuss risk factors leading to arterial and venous thromboembolic disease, and suggest appropriate work-up

5.2.16 Interpret results of laboratory tests utilized in the management of bleeding and thrombotic disorders

5.2.17 Demonstrate competency in interpreting coagulation studies for the diagnosis of bleeding and thrombotic complications

5.2.18 **The resident should be able to diagram each of the following assays, explain the methods used, when the tests are indicated, and how results are to be interpreted:**

Platelet assays
1. Bleeding time
2. Platelet function assay (PFA)
3. Platelet aggregation studies (both whole blood and platelet-rich plasma)

Clotting-based assays
4. PT
5. aPTT
6. TT
7. Factor assays
8. APCR/ATIII/Protein C/S
9. Lupus anticoagulant panel
10. Fibrinogen
11. D-dimer
12. H FV Leiden
13. H FII hyperprothrombinemia mutation
14. H FVIII and FIX mutations and hemophilia
Other assays--
15. Plasma homocysteine
16. Thromboelastography

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5.4.3.2 Demonstrates dedication to patient’s care, academics, and teaching
5.4.3.3 Maintains good relationships with laboratory and clerical personnel, nurses, managers, supervisors, and with attendings and with other fellows and residents.

5.5 Systems
5.5.1 Demonstrate the ability to develop new policies and procedures or change existing policies and procedures based on a review of the literature or issuance of new guidelines by regulatory agencies
5.5.2 Demonstrate familiarity with quality systems as they apply to coagulation (e.g. FDA, CAP, JCAHO)
5.5.3 To develop an understanding of quality assurance and quality control issues (see Regulatory)