LOYOLA UNIVERSITY MEDICAL CENTER
Department of Pathology and Laboratory Medicine

Transfusion Medicine / Blood Bank / Donor & Therapeutic Apheresis
Pathology Resident’s Key Operational Objectives for the Rotation

After completion of 3 months of this Clinical Pathology Rotation, the resident should be able to:

1) Assess and evaluate blood donor qualification criteria, using current MANDATORY regulations (FDA) and the “voluntary” national accreditation Standards of practice (e.g., AABB, CAP, TJC and FACT).
2) Evaluate and interpret the results of the laboratory and clinical work-ups of reported transfusion reactions, including recognition of clinically significant RBC and WBC alloimmunization risks and episodes.
3) Recognize the scope and degrees of severity of donor reactions, including apheresis donation and the common techniques of clinically managing these reactions.
4) Perform Blood Utilization Review activities for the Blood Usage Committee, using recognized institutional indicators and principles of Quality Assessment and Improvement.
5) Train in fundamental laboratory immunohematology: Perform and interpret ABO, Rh typing, direct and indirect antiglobulin testing, antibody detection and (simple) antibody identification and crossmatch techniques, using standard Blood Bank serologic methods. Recognize the limitations of laboratory techniques and be able to develop differential diagnoses based on results.
6) Observe the methodology and describe the principles of blood component preparation, storage, transportation and processing (e.g., disease testing).
7) Train in fundamental Tissue Typing Laboratory techniques: HLA testing antigen and antibody testing; Panel Reactive Antibody (order "LUMPRA") testing and their clinical significance; HLA methods such as serologic and low / high-resolution molecular techniques.
8) Understand the elements of informed consent and know the current estimates for residual risks and adverse effects of transfusion and of transfusion-transmitted infectious diseases, understanding the bases of these estimates.
9) Recognize and appreciate the key elements of a Blood Bank / Transfusion Medicine Consultation; know how to write patient orders, procedure notes, transfusion reaction progress and consultation notes in the EPIC HIS and to make recommendations for appropriate, indicated hemotherapy.
10) Know and apply the principles of Patient Blood Management & guidelines regarding component hemotherapy, recognizing the principle indications and non-indications for use of blood components.
11) Know and identify clinical indications for therapeutic hemapheresis and peripheral blood stem cell harvesting; recognize and treat the common adverse effects of hemapheresis.
12) Present, attend and contribute to In-Service teaching and Clinical Pathology conferences, which have Transfusion Medicine applications, as available.
13) Read, study and synthesize didactic readings from standard transfusion medicine textbooks, review articles and journal articles; achieve proficiency in evaluating the worth of peer-reviewed articles in the literature.
14) Perform Transfusion Medicine projects, such as computerized literature searches, data collection and organization using the Mysis Blood Bank LIS, the EPIC HIS, collect data for ad hoc projects, etc., to facilitate quality or performance improvement activities as well as to train in laboratory administration.
PATHOLOGY RESIDENT RESPONSIBILITIES
BLOOD BANK / TRANSFUSION MEDICINE ROTATIONS

1) Be available for and be personally involved in, Blood Bank / Transfusion Medicine consultations, problem solving and medical, technical or administrative decision-making processes

2) Answer Blood Donor Qualification questions from the Apheresis Center staff

3) Evaluate & interpret results of Transfusion Reaction work-ups. Recognize and understand clinically significant RBC and WBC alloimmunization episodes. Learn how to write interpretative progress notes in the medical record on the results of the reported reaction work-up, including recommendations for future transfusions.

4) Perform monthly Blood Usage Review Auditing activities, as assigned, for Blood Usage Committee; attend weekly Blood Bank Quality Unit & monthly Blood Usage Committee meetings; make short presentations on cases or quality issues, as necessary.

5) Train in laboratory immunohematology: perform “wet” laboratory exercises and demonstrate ability to group & type rbc's, and to perform antibody detection and identification, as available. Learn how to interpret rbc antibody identification panels.

6) Write or be aware how to write physician orders for all therapeutic procedures performed in the Apheresis Center; know the elements of and obtain informed consent for blood transfusions & other therapeutic procedures.

7) Present at least one Blood Bank In-Service to the technical staff

8) Present Clinical Pathology conferences, as scheduled and appropriate, using recent cases which have Blood Banking / Transfusion Medicine / Apheresis problem solving and applications.

9) Read, study, and assimilate required didactic material: The AABB Technical Manual, textbooks, review articles and chapters, recent or unique or valuable journal articles, as assigned and recommended.

10) Maintain your pager in the “ON” status, taking evening and weekend call as necessary, by arrangement with attending physician. Be willing to cover the Service on an ad hoc basis, as necessary.

11) Be accessible to the Blood Bank Director, manager, technical specialists to help solve ad hoc patient management and administrative issues and crises, on an individual basis, as they occur.

12) Be available and willing to do small projects (e.g., literature searches, data collection and organization, new transfusion-related programs, etc.) aimed at improving quality, patient care, blood inventory management and the educational mission of the rotation

13) Other duties as necessary and assigned
Early **Required** Reading
[The remainder of the Manual is *recommended* reading]

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Pathology Resident’s Duties for Reporting Results of Transfusion Reactions

1) AABB Standards require that a statement be made, for us at LUMC in the patient’s (electronic) medical record, of the results of a transfusion reaction work-up.

2) Pathologists can bill for the interpretation of transfusion reaction work-ups.

Recommended Format for a Progress Note on the Interpretation of Transfusion Reactions:

The note should contain the following elements (A through E) – you may paraphrase

“Blood Bank / Transfusion Medicine Resident Note”

A. “RE: Transfusion reaction reported on ____________ (specify date, time), during or after the transfusion of component ____________ (name it, such as RBC, thawed plasma, etc.), Unit # ________________ (specify individual unit number[s])”

B. Reported signs / symptoms during or after the transfusion included … specify what was reported, such as,
   • Fever and/or chills
   • Hives and itching (urticaria and pruritus)
   • Shortness of breath
   • Symptomatic hypotension
   • Anaphylactic shock / septic shock
   • Decreasing Hgb / Hct, a number of days after RBC transfusion

C. Laboratory evaluation or work-up revealed … four significant negative findings:
   • “No evidence of clerical errors”
   • “No visual evidence of hemolysis”
   • “A negative posttransfusion direct antiglobulin test (DAT)”
   • “Post-transfusion repeat ABO typing

   “The above 4 findings essentially rule out an episode of acute immune-mediated hemolysis.”

   If the laboratory results are different than above, they need to be described, appropriately and interpreted.

   The above 4 items, under C., are the minimum laboratory work-up that are required by the AABB Standards to evaluate adverse effects of transfusion. Other more detailed testing can be done, depending upon the nature or severity of the adverse effect. There is a Blood Bank SOP for these contingencies.
D. “Interpretation or Assessments”, using the CDC Hemovigilance Protocol definitions:

- E.g., in the setting of fever and/or chills, **without** evidence of hemolysis,

  **“Febrile non-hemolytic transfusion reaction.”** Residual WBC in the component or pre-formed HLA antibodies can cause these reactions. In addition, **pro-inflammatory cytokines**, formed in vitro from degrading, residual WBC in stored blood components and which act as endogenous pyrogens, can cause fevers.”

- In the setting of simple cutaneous hypersensitivity, manifested by **only** pruritus & urticaria,

  **“Allergic transfusion reaction.”** These reactions are commonly due to unknown plasma proteins, whose identity is neither sought nor found.” (The diagnosis is made clinically.)

E. “Recommendations”:

- **For Febrile non-hemolytic transfusion reactions (FNHTR’s):**
  - In the setting of episodic future transfusions, state
    “Avoid using antipyretic pre-medications, such as Tylenol”
  - “All patients receive pre-storage leukocyte-reduced cellular components.”

- **For simple, cutaneous “allergic” transfusion reactions,** state,
  “For future transfusion of plasma-containing components, consider avoiding antihistaminic pre-medications prophylactically because their efficacy is unproven.”

- Other adverse effects require individualization of the clinical evaluation. Discuss with the Blood Bank Medical Director or physician designee.

**Note that uses of other specialized components are reserved only for selected transfused populations.** When necessary, we help make that clinically correlated decision by placing a free text comment in the patient’s Blood Bank Sunquest (LIS) BAD (Blood Administration) file. When specifications are made in the LIS BAD file, all future components are provided as specified (e.g., CMV-seronegative, irradiated, etc.)
PHYSICIAN RESPONSIBILITIES for THERAPEUTIC HEMAPHERESES
Loyola University Medical Center Apheresis Center

Indications and Contingency Planning:

- Make sure the indication for therapeutic apheresis is legitimate! (Ask the important question, “Is the procedure indicated?”)
  - Review the indications for therapeutic apheresis
  - Avoid depending on “anecdotal evidence”; depend on the results of clinical trial data, where available
  - Therapeutic plasma exchange (TPE) is a first-line therapy in TTP.
  - In general, apheresis is reserved for 2nd or 3rd place in the armamentarium of therapy for other diseases
- Make sure there is staffing and apheresis devices available for the procedure, especially if the procedure is an “add-on” or urgent. Call a staff or on-call nurse.
- Decide on the frequency of apheresis, at the beginning of the course of therapy
  - Usually, for TPE involving an IgG antibody / paraprotein, q OD or q 3-day procedures are preferred (only 45% of IgG’s are distributed intravascularly)
  - Therapeutic cyto-reductions (RBC exchanges, WBC or platelet reductions) may be required for 2 or more consecutive days, but requires clinical correlation
- Choose vascular access appropriately
  - Always request central catheters for procedures requiring 2 or more cycles; most sick patients do not have antecubital veins or strength to perform repeated procedures.
  - Always prefer dual-lumen Hemodialysis-style catheters, such as Quinton, Arrow and other manufacturers’ designs.
  - In general, most triple-lumen catheters, Swan-Ganz type catheters, PICC lines, Port-a-Caths are NOT able to deliver the flow rates required for any hemapheresis.
- Choose replacement fluids appropriately
  - Usually, for a 3-liter TPE, replacement fluids might be 2 liters of 5% human albumin and 1 liter of NS, but this needs to be clinically correlated.
  - For TTP, TPE requires isovolemic replacement with thawed plasma or combinations of plasma and albumin
- Write or clarify orders with unit nursing for the “flushing” of apheresis catheter devices, q 12 hours or at least q 24 hours on days when a TPE is not done.
  - Aspirate 3 – 5 mL from both ports and discarded, to eliminate intraluminal debris
  - Flush both ports with 10 mL of 0.9% saline
  - Instill 1.5-2.0 mL of Heparin, Inj., 1000 U/mL, into both ports
  - AVOID USING “HEP-LOCK”, which is too dilute (100 U/L)
- Decide what parameters are to be followed, such as laboratory values / clinical assessment
  - For example, in TTP, follow LDH, reticulocyte indices, CBC, signs/symptoms; aim for a stable and durable hematological remission
  - In Waldenstrom’s macroglobulinemia, follow IgM level and serum viscosity
  - In multiple myeloma, follow paraprotein level, renal function, serum viscosity
  - In sickling hemoglobinopathies, follow hemoglobin fractionation with the % Hgb A being germane (aim for ≤ 30% of Hgb S, depending on clinical situation)
  - In primary or secondary thrombocytoses, platelet deplete for symptoms (thromboses or bleeding); absolute counts as “targets” are less important
  - In leukocytoses, myeloid blasts are the stickiest! The % blasts are important to consider. Leukostasis should be prevented; correlate signs and symptoms with absolute counts
- Decide when it is appropriate to STOP therapeutic aphereses!! Decision points are not always clear.
PHYSICIAN RESPONSIBILITIES for THERAPEUTIC HEMAPHERESES
Loyola University Medical Center Apheresis Service

Once the decision to proceed with a procedure (such as a therapeutic hemapheresis or a PBSC harvest) is made on a given day, a physician must be available to do the following:

An MD may be necessary for the following activities: (Some of these activities might be done “remotely”, but it is best in general to be on-campus.)

- On Day #1, facilitate placement of the central line without delay
- On Day #1, obtain Informed Consent for the procedure: Be able to answer questions from the patient or family about the risks, benefits and alternatives of the procedure.
- Make sure the patient is available for the procedure when scheduled. The Apheresis Nurse Coordinator may need to negotiate with other clinical services or with other procedures (such as hemodialysis, interventional procedures, etc).
- If on-call, in the absence of a second staff nurse or physician on duty, an MD must verify the identity of the patient and of the blood components (such as RBC or FFP) on the Transfusion Record Forms.
- Help pool blood components or albumin replacement fluids, if necessary
- Choose and order appropriate laboratory tests (PRE- and POST-procedure) appropriate for specific clinical situations
- Be available for emergencies and telephone orders for drugs or other procedures; sign all verbal and telephone orders promptly!
- Decide / negotiate when a repeat procedure is to be scheduled; contact the clinical service, then make sure the repeat procedure is on our schedule
- When the procedure is successfully completed, WRITE A PROCEDURE NOTE in EPIC, noting
  ✓ That the procedure was well tolerated
  ✓ Any acute adverse effects or none due to the procedure
  ✓ The PLAN for the next procedure

- Be available for all patient care activities and emergencies
Title of Note might include: “Blood Bank / Transfusion Medicine Resident Procedure Note”

S = “Subjective”:

In a few sentences, state:
- The indication for hemapheresis and/or what Service requested the procedure
- How the patient is doing today (Has anything changed? Complications?)
- Any new findings, complications, verbal complaints or progress

O = “Objective”:

- New or changing physical examination findings
- Vascular access issues, if any
- Today’s laboratories, or those which are serially being followed

A = “Assessment”:

- This might include “S/P whatever any surgeries”, “condition or diagnosis”, new comments on prognosis (“stable”, “worsening”, “improving”), etc.
- The details of the actual procedure done TODAY, e.g., including make mention of all of the following in your note…

“This therapeutic hemapheresis was successfully performed using the Spectra Optia (or other) Blood Cell Separator.”

Operational details of any given procedure will be found in the Apheresis Nursing notes or the Epic Flowsheets.

State the following: “Patient tolerated procedure well without acute adverse effects noted.”

P = “Plan”: State what our Service plans to do for this patient next.

For Example, “Repeat TPE scheduled tomorrow” at a specific time.

Sign your note and state your pager number.