University of Washington
Pathology Residency Program
Clinical Pathology
Goals and Objectives

Program Philosophy

Clinical laboratories have assumed a major role in the prevention, diagnosis, prognosis and treatment of disease. Direction of clinical laboratories is best provided a well-trained physician who combines the knowledge of clinical medicine with a broad understanding of laboratory and information technology and the principles of laboratory management. The clinical pathologist is specifically trained for this role. As traditional boundaries among the laboratory disciplines become less distinct, the clinical pathologist requires a broad understanding of the basics of the major laboratory disciplines, including chemical pathology, hematology, immunopathology, microbiology and virology, and transfusion medicine. An in-depth mastery of one of these disciplines provides a basis for focused development of knowledge and skills. Understanding is also required in a variety of areas that transcend traditional disciplines, including molecular diagnosis, medical ethics, oral and written communication skills, information management, laboratory management, quality assurance, and medical economics.

Additionally, the clinical pathologist should develop and be able to demonstrate competency in areas that are cogent to the practice of medicine in all its forms. These general physician competencies include patient care, medical knowledge, practice-based learning and improvement, interpersonal and communication skills, professionalism, and systems-based practice. An understanding of the principles of scientific inquiry is necessary to guide laboratory investigations that may range from troubleshooting a method to advancing our understanding of the cellular and molecular bases of disease pathology.

To maintain currency in this rapidly evolving field, the ability to define and obtain the knowledge necessary to answer a question or solve a problem must be coupled with an attitude that values continual, self-directed education. The clinical pathologist must also exhibit leadership in advancing and promulgating knowledge of laboratory medicine among medical practitioners through clinical consultation and teaching.

An outstanding training program must develop the requisite knowledge, attitudes and skills, while addressing the variety of professional goals held by its trainees. This requires an organized program that exposes residents through direct experience to the broad variety of practice and decision-making that the field encompasses, while offering the opportunity and resources for a substantial component of self-directed education. Such a program couples a formal didactic program with assignment of increasing clinical responsibilities, commensurate with the level of knowledge and competency, and provides graded assignment of personal responsibility for defining and achieving educational goals.

Program Goals

The mission of the residency program is two-fold: To provide outstanding training for the future leaders in pathology and laboratory medicine, and to help provide the highest quality of laboratory services to the patients and physicians of the University of Washington Academic Medical Center and its affiliate institutions. The focus of the program is experiential learning through laboratory management and clinical consultation, with the objective of optimizing the use of the laboratory in providing quality patient care. The overall goal of the core program is also dual, depending on the career goals of the trainee: For those seeking a career in academic medicine, it is to provide an excellent educational foundation for additional subspecialty and/or research fellowship training. For those anticipating a career in community pathology, it is to provide depth of experience in a selected subspecialty sufficient to allow direct assumption of a laboratory directorship, as well as a breadth of experience in all disciplines to provide competent cross-coverage and to develop quickly the ability to direct laboratories in other subspecialties through on-the-job experience.

The primary objective of the first year of training is to develop a broad base of expertise in laboratory medicine. Training covers chemical pathology, including urinalysis, toxicology, endocrinology, and laboratory automation; genetics and molecular diagnostics; diagnostic immunology; hematology, including hematopathology and flow cytometry; coagulation; microbiology, including bacteriology, parasitology, and mycology; virology; and transfusion medicine. This experience is provided through individual in-depth rotations at UWMC, Harborview and Veterans Affairs Medical Centers. Each rotation has its own educational goals and objectives.

The goals in the second year are to deepen and broaden the knowledge, attitudes and skills developed during the first year and to develop a special expertise in one or two areas of laboratory medicine through acting directorship of a component of a clinical laboratory. Acting directorships may be pursued in laboratories at UWMC, HMC, VAMC, and the Fred Hutchinson Cancer Center. There is also the opportunity to deepen one's understanding of Transfusion Medicine through a rotation at Puget Sound Blood Center. For those pursuing two full years of core CP training, there is the opportunity to increase one's knowledge of the principles of scientific inquiry through focused investigation of a meaningful problem.

Other goals are addressed in an ongoing fashion throughout the program. The development of teaching and communications skills is achieved through frequent clinical consultations; presentations at Departmental Grand Rounds, and the Research Conference; and the teaching of medical and medical technology students. Residents learn the basic principles of a laboratory/hospital information system, as used for patient and data management, and routinely use a personal computer for word processing, spreadsheet calculations, graphics, lecture presentations, simple statistics, e-mail, and information retrieval, including Medline and internet applications.

Because it is impossible to know everything one needs to know, residents must develop personal strategies for rapidly identifying and obtaining needed information. This includes developing habits of personal scholarship and lifelong learning to maintain awareness of the current state of medical knowledge, and the development of the intellectual flexibility needed to respond effectively to problems not previously encountered. Residents should also learn the basics of laboratory management, including medical economics, medical and business ethics, regulatory issues, medico legal concerns, budget preparation, capital budget and program proposals, assay validation, quality control and quality assurance.

General Competencies

All physicians, regardless of specialty, should develop a set of general competencies during residency training. These include patient care, medical knowledge, practice-based learning and improvement, interpersonal and communication skills, professionalism and systems-based practice. The routes for development and application of these competencies by clinical pathologists are somewhat different from those for physicians whose practices primarily involve direct delivery of patient care.

Competency in assisting patient care comes through clinical consultation on the suitability of laboratory investigations to answer patient management questions and the interpretation of the results of testing. Medical knowledge is developed through consultation with faculty, didactic lectures, attendance at conferences within and outside the Department, and self-directed learning. In the context of Laboratory Medicine, practice-based learning and improvement come through the application of the principles of quality assurance to all aspects of laboratory operations, as well as to one's personal performance.

Interpersonal and communication skills are developed particularly through clinical consultation, and also through interactions with faculty, residents, fellows, and medical technologists, and through written and oral communications (lab procedures, journal articles and reviews, lectures and other formal talks). Professionalism includes meeting professional responsibilities, adherence to ethical principles, and

sensitivity to a diverse patient population. It is best learned through observation of faculty role models. Systems-based practice refers to the context of the resources, practice guidelines, policies and regulations that empower and restrict the practice of pathology in your institution, region, state and nation. Maintaining an awareness of ongoing changes in systems of medical practice and health care delivery requires regular input from up-to-the-minute resources, including professional societies, institutional bulletins, journals, newsletters, and listservers.

Resident Portfolio

Medicine has become increasingly on the existence of documented evidence to support decisions and practices. This extends to a need for concrete documentation of resident competency. One well-accepted way of documenting competency is by the development of a portfolio of representative work products. Accordingly, each resident will develop an electronic portfolio documenting experiences and work products while a resident. This may include summaries of consultations, etc., while on call or on rotations, papers and abstracts published or submitted, PowerPoint presentations of Grand Rounds and other formal talks, method evaluation data and written procedure(s) from your method development project, and anything else that may be useful to the American Board of Pathology, the Accreditation Council for Graduate Medical Education, or a potential future employee in evaluating the resident's competency and training. At the end of your training, your portfolio will be copied onto a CD, with a copy placed in your file. You will also receive a copy for your personal use.

Laboratory Medicine "Core" Objectives

- To become familiar with the faculty, staff and resources of the Department of Laboratory Medicine.
- To understand fundamental analytical principles and processes used in clinical laboratory testing.
- To understand the practical and theoretical basis for laboratory test selection and interpretation.
- To respond appropriately and effectively to situations commonly encountered when taking call.
- To begin learning the body of knowledge needed for board exams
- To obtain an understanding of the elements that contribute to professional competence, including patient care, medical knowledge, practice-based learning, interpersonal and communications skills, professionalism, and systems-based practice.

First-Year Chemistry Rotation Goal

The overall goal of the Clinical Chemistry rotation is to provide the resident with a set of tools that will enable the resident to develop and maintain a level of expertise in clinical chemistry appropriate to the professional responsibilities undertaken as a practicing pathologist. This could range from understanding the role of fundamental analytical and quality principles that underlie laboratory techniques employed in the clinical chemistry laboratory (as well as in hematology, microbiology, molecular diagnostics, and transfusion medicine) to full direction of a clinical chemistry laboratory. These tools will include basic principles of analytical chemistry, quality assurance, and laboratory management; development of effective personal reference tools (textbooks, journals, files, databases, search strategies, etc.); and development of a set of personal educational objectives for the rotation and the residency. Opportunities will be provided to become proficient through employing these tools in the clinical laboratory setting, particularly in the context of developing and/or validating a new laboratory methodology.

Objectives

A number of specific objectives subtend the overall goal. These objectives are presented below, organized by the general competencies defined by the Accreditation Council for Graduate Medical Education (ACGME) and the Pathology Residency Review Committee (RRC) as expected of all residents.

Patient Care

The resident will demonstrate ability to provide effective clinical consultation; specifically, to:

- Gather appropriate and accurate clinical information from all available sources
- Interpret laboratory test results within the clinical context
- Develop a diagnosis or differential diagnosis, based on laboratory results and clinical information
- Use information technology to support patient care decisions and education of practitioners
- Use evidence-based medicine and clinical decision-making concepts to interpret results and to make informed decisions
- Advise clinicians on the choice of clinically appropriate, cost-effective tests
- Advise clinicians on appropriate follow-up for unexpected test results
- Work with health care professionals and teams to provide patient-focused care

Medical Knowledge

The resident will demonstrate:

- Knowledge of common clinical chemistry tests and their medical application and correlation
- Knowledge of the effects of disease, drugs, matrix and preanalytical variables on chemistry test results
- General knowledge in the basic and clinical sciences necessary for effective consultation in laboratory medicine
- Knowledge of the principles and practice of laboratory management
- Ability to collect and evaluate medical evidence regarding the utility of laboratory tests
- An investigative and analytic approach to laboratory and clinical questions
- Ability to use a variety of resources to investigate clinical questions
- Development of a personal strategy to regularly maintain and update medical knowledge

Practice-Based Learning and Improvement

The resident will demonstrate:

- Ability to find, evaluate and assimilate evidence from scientific studies
- Application of statistical and study design principles in evaluation of evidence
- Ongoing identification and remediation of gaps in personal medical knowledge
- Understanding of and ability to apply the principles of quality control and quality assurance
- Ability to evaluate current and proposed testing methods for analytical performance, clinical utility and cost-effectiveness
- Use of proficiency-testing results to improve laboratory practice
- Ability to use laboratory problems and clinical inquiries to identify process improvements to increase patient safety and minimize opportunities for medical errors
- Use of self-reflection to evaluate and improve personal habits and strategies of practice
- Active facilitation of the learning of students and health care professionals

Interpersonal and Communication Skills

The resident will demonstrate:

- Ability to work with others as part of a health care team
- Ability to communicate clearly and effectively with clinicians, medical technologists and other medical personnel
- Ability to use appropriate modes of communication (listening, non-verbal, explanatory, questioning)
- Ability to choose and use appropriate communication mechanisms (face-to-face, telephone, e-mail, written)

- Ability to express ideas and positions clearly and effectively, both verbally and in written documents (including legible handwriting)
- Ability to prepare and deliver effective presentations

Professionalism

The resident will demonstrate:
- Respect, compassion and integrity
- Responsiveness to the needs of patients and society that supersedes self-interest
- Knowledge and understanding of ethical and privacy issues affecting the clinical laboratory
- Maintenance of confidentiality of patient information
- Consistent performance of all duties in a timely, dependable, and responsible manner
- Prompt and courteous response to all pager and telephone calls
- Regular, punctual attendance and participation in rounds, conferences, meetings and rotation responsibilities
- Commitment to excellence and ongoing professional development

Systems-based Practice

The resident will demonstrate:
- Understanding of the role of the laboratory in the health care system, and the importance of reliable, cost-effective and timely laboratory results in clinical decision-making
- Understand the interactions of the national health care system, the various types of local and regional health care delivery systems, UW Medicine and the Department of Laboratory Medicine.
- Understand the developing role of laboratories in preparedness for biological and chemical terrorism
- Ability to work with clinicians, administrators and others to determine the role of the laboratory in specific situations to optimize patient safety and outcomes
- Understanding of CLIA, CAP and JCAHO requirements for clinical laboratories
- Understanding of basic laboratory reimbursement mechanisms and regulatory requirements, including kickbacks and compliance with Medicare/Medicaid “fraud and abuse” avoidance requirements
- Ability to do cost analysis of laboratory tests

Specific competencies:

In addition to the above general competencies, you should be able to do the following by the end of the rotation:

Consultation: Carry out effective consultations on clinical chemistry issues, including:
- Defining the question or issue to be addressed
- Obtaining relevant clinical information
- Identifying the knowledge necessary to address the issue, and remedying any gaps in your personal knowledge
- Reaching appropriate conclusions and communicating them effectively
- Following up to learn outcome of your recommendations

New Test: Obtain information about a previously unrequested test:
- Who does the testing?
- Clinical information—reference or therapeutic ranges, clinical performance parameters (pre-test probability, sensitivity, specificity, predictive value)
- Analytical issues—precision, interferences
- Financial issues—cost, reimbursement, who pays?

- Regulatory issues—research or clinical; medically necessary or required by study protocol; FDA-approved or "home brew"; CLIA-licensed?

Patient Safety Investigation: Investigate specific laboratory errors to determine:
- Type of error
- Harm or potential harm to the patient
- System changes to reduce chance of recurrence

Method Validation: Validate commercial and in-house methods according to CLIA and CAP requirements, including:
- Accuracy and precision
- Analytical sensitivity and specificity
- Analytical measurement range
- Reference range (see below)
- Comparison with previous or reference method

Reference Range: Design and interpret studies to establish or verify reference ranges, using normal distributed and skewed data

Cost Analysis: Determine average and marginal costs for performing a given laboratory test.

Quality Control And Proficiency Testing: Use control data (Levy-Jennings plots) and proficiency testing results to assess and troubleshoot method performance.

Responsibilities

I. Orientation to Laboratories

The resident should arrange with the appropriate laboratory supervisors at UWMC, HMC or the VAMC to receive an initial orientation to key areas and personnel. By the second week of the rotation, the resident should have met the lead technologists for each chemistry section at HMC and UWMC, or corresponding personnel for the VAMC.

II. Method Development/Evaluation Project

A laboratory project will be selected and carried out with the guidance of a faculty advisor. The project should provide direct experience in the process of method development and evaluation, including the determination of a calibration curve, analytical measurement range and reference range; evaluation of precision, accuracy, and interferences; and, if appropriate, comparison with a previous or reference method. Residents should learn and use statistical methods appropriate to the project, and should understand how to assess the cost and clinical utility of a new test. Residents should also prepare a written procedure, written in conformity with NCCLS GP2-A4 guidelines. Presentation of results at local conferences and national meetings (e.g., ACLPS, AACC) is encouraged.

III. Management Responsibility

Residents will assist the faculty in managing the laboratory. Responsibilities will vary with the faculty advisor, but may include such items as:
- Review of internal and external quality control reports
- Preparation or revision of test information sheets, procedures, and other documents
- Assistance in ongoing evaluation and implementation of new methods or instruments;
- Liaison with clinical services regarding unusual test results, problem specimens, laboratory errors, etc.;

- Maintaining compliance with CAP, CLIA, OSHA, chemical hazard, and other standards and regulations.

IV. Presentations and Conferences

Various presentations will be made during the rotation:

1. *Research Conference*
   Presentation will normally relate to the resident's project, but may also be a journal club on recent article(s) related to clinical chemistry.

2. *Medical technologists' continuing education.*
   A topic of mutual interest will be chosen by the resident and the laboratory supervisors. For example, the resident could present a case study related to an interesting call. The same presentation will be made to technologists at UWMC, HMC and the VAMC.

1. *Lectures to Medical Technology students.*
   Each resident will typically present one or two lectures to Medical Technology students in the "Laboratory Medicine 322: Introductory Clinical Chemistry" class held in the Fall quarter. (These lectures will not always coincide with the resident's Chemistry rotation.)

2. *Test of the Week.*
   The resident will give a brief (15-20 min) presentation to the faculty on a selected case or test once weekly

I. Call

Call continues as usual during the rotation. In addition, residents should work up some calls related to clinical chemistry in greater depth during the rotation. This will involve direct discussion with the relevant technologists, the Chemistry fellows, and faculty, and should cover such points as methodology used, results obtained, clinical interpretation, and any management issues.

Conferences and Meetings

Residents are expected to attend all Laboratory Medicine Conferences during the rotation:
Didactic Conference, On-Call Rounds, Research Conference and Grand Rounds

Residents will attend the following Chemistry meetings:
Harborview Leads meeting, 8 AM on first Tuesday morning each month
UWMC Leads meeting, 1 PM on the second Tuesday afternoon each month
Chemistry Management Meeting, 1:30 PM each Wednesday afternoon

Residents will participate in the weekly Poison Center Conference Call at 8:30 AM on Monday (1-800-575-8877; conference code 333#). This will be followed by a meeting with Dr. Rainey.

Residents will also meet with Dr. Rainey at a time to be determined to discuss progress on method development projects and meeting rotation objectives. (This time may change, depending on competing priorities; e.g., during the Biostatistics course)

Residents will meet with Dr. Sadrzadeh at Harborview on Tuesday mornings, and on Thursday, time to be determined.

Residents should attend the Wednesday morning didactic sessions for the Chemistry Postdoctoral program (usually 9-11 AM; check the schedule for deviations)

Residents will meet with Drs. Rainey and Sadrzadeh once weekly, alternating between Harborview and UW. Each resident will give a 15-20 minute in-depth presentation of a selected case or test method.

Residents will meet with Chemistry Laboratory Lead technologists for bench teaching of clinical chemistry methods at times to be determined by resident interests and staff availability.

Residents are strongly encouraged to attend selected lectures in the LAB MED 322 course "Introductory Clinical Chemistry" (M,T,W, F at 10:30 AM in HSC T-531, Fall Quarter) and/or the LAB MED 418 course "Topics in Clinical Chemistry" (M,W, F at 1:30 PM in HSC T-739).

Portfolio

The following items should be in the resident's portfolio at the end of the rotation:

Mandatory

1. A list of personal objectives for training in Laboratory Medicine. As goals evolve, a new set of goals may be added, without deleting the old set. Instead, there should be written reflection on the basis for the changes.

2. Descriptions of at least ten (10) representative cases or problems handled or resolved by the resident. This should consist of a description of the case or problem, information and data collected by the resident, and the resolution with appropriate follow-up. The full description should rarely exceed one typewritten page. All patient data should be "de-identified."

3. A procedure for a laboratory method written by the resident in conformity with NCCLS GP2-A4. This will preferably be for a method developed by the resident.

4. A method evaluation, including a cost analysis; assessment of precision, accuracy, interferences and reference range; and comparison with a previous or reference method. This will preferably be for a method developed by the resident.

5. Documents for LabMed 322 lectures, including Powerpoint presentations, handouts, and exam questions.

6. Documents for Medical Technologist continuing education lectures, including Powerpoint presentations and handouts.

7. A list of resources regularly used to maintain and update medical knowledge

Optional

1. CAP checklists from actual, mock or self-inspections carried out by the resident.

Resources

"Henry:" JB Henry. Clinical Diagnosis and Management by Laboratory Methods, 20th Ed. W.B. Saunders, Philadelphia. 2001. The standard reference for clinical pathology.

"Tietz:" CA Burtis and EA Ashwood. Tietz Textbook of Clinical Chemistry. 3d Ed. W. B. Saunders, Philadelphia. 1999. The standard reference for clinical chemistry.

Mini-Tietz (Tietz Lite?): CA Burtis and EA Ashwood. Tietz Fundamentals of Clinical Chemistry. 5th Ed. W. B. Saunders, Philadelphia. 2001. More user-friendly than mega-Tietz. Not as good as a reference.

LA Kaplan, AJ Pesce, and SC Kazmierczak. Clinical Chemistry: Theory, Analysis, Correlation, 4th Ed. Mosby, St. Louis. 2003. More user-friendly than either Tietz book. A bit spotty in coverage.

DS Jacobs, WR DeMott and DK Oxley. Jacobs & DeMott Laboratory Test Handbook, 5th Ed. Lexi-Comp, Hudson, Ohio. 2001. An excellent reference book for detailed information on individual tests. Not a textbook.

First-Year Coagulation Rotation Goal

The overall goal of the Clinical Coagulation rotation is to provide the resident with a set of tools that will enable them to develop and maintain a level of expertise in clinical coagulation appropriate to the professional responsibilities undertaken as a practicing pathologist. This ranges from understanding the biochemistry behind the hemostatic system to full direction of a clinical coagulation laboratory. These tools will include basic background information on the hemostatic system and the major disorders associated with it, an understanding of the most common assays used in assessing clinical hemostasis, clinical interpretation of hemostatic assays, quality assurance, laboratory management, development of effective personal reference tools (textbooks, journals, files, databases, search strategies, etc.), and development of a set of personal educational objectives for the rotation and the residency. Opportunities will be provided to become proficient through employing these tools in the clinical laboratory setting.

Coagulation Objectives

A number of specific objectives subtend the overall goal. These objectives are presented below, organized by the general competencies defined by the Accreditation Council for Graduate Medical Education (ACGME) and the Pathology Residency Review Committee (RRC) as expected of all residents.

Patient Care

The resident will demonstrate the ability to:

- Gather appropriate and accurate clinical information with an emphasis taking a careful history relating to bleeding and thrombosis
- Interpret clinical coagulation laboratory test results within the clinical context
- Use clinical decision-making concepts and techniques in interpreting results
- Advise clinicians on the choice of clinically appropriate, cost-effective tests
- Advise clinicians on appropriate follow-up for unexpected test results

Medical Knowledge

The resident will demonstrate:

- Knowledge of common clinical coagulation tests and their medical application and correlation
- Knowledge of the effects of disease, drugs, matrix and preanalytical variables on coagulation test results
- Ability to collect and evaluate medical evidence regarding the utility of laboratory tests
- Ability to use a variety of resources to investigate clinical questions
- Development of a personal strategy to regularly maintain and update medical knowledge

Practice-Based Learning and Improvement
The resident will demonstrate:

- Ongoing identification and remediation of gaps in personal medical knowledge
- Understanding and ability to apply the principles of quality control and quality assurance
- Ability to evaluate current and proposed testing methods for analytical performance, clinical utility and cost-effectiveness
- Use of proficiency-testing results to improve laboratory practice
- Ability to use laboratory problems and clinical inquiries to identify process improvements that may minimize opportunities for medical errors

Interpersonal and Communication Skills
The resident will demonstrate:

- Ability to communicate clearly and effectively with clinicians, medical technologists and other medical personnel
- Ability to use appropriate modes of communication (direct, telephone, e-mail, written)
- Ability to prepare and deliver effective presentations

Professionalism
The resident will demonstrate:

- Knowledge and understanding of ethical and privacy issues affecting the clinical laboratory
- Maintenance of confidentiality of patient information
- Respectful behavior towards all patients and medical personnel
- Prompt and courteous response to all pager and telephone calls
- Regular, punctual attendance and participation in rounds, conferences, meetings and rotation responsibilities

Systems-based Practice
The resident will demonstrate:

- Understanding of the role of the laboratory in the health care system, and the importance of reliable, cost-effective and timely laboratory results in clinical decision-making
- Ability to work with clinicians, administrators and others to determine the role of the laboratory in specific situations to optimize patient outcomes
- Understanding of CLIA, CAP and JCAHO requirements for clinical laboratories
- Understanding of basic laboratory reimbursement mechanisms and regulatory requirements, including compliance with Medicare/Medicaid "fraud and abuse" avoidance requirements

First-Year Hematology Rotation Goal
The overall goal of the Hematology rotation is to provide the resident with a set of tools that will enable him or her to develop and maintain a level of expertise in laboratory hematology appropriate to the professional responsibilities of a practicing pathologist. These tools will include: 1) basic principles of laboratory hematology, including red cell disorders, hematopathology, molecular diagnosis, quality assurance, and laboratory management; 2) development of effective personal references, including textbooks, journals, files, databases, search strategies, etc.; and 3) development of a set of personal educational objectives for the rotation and the residency. Opportunities to gain proficiency in hematology by employing these tools in the clinical laboratory will be provided.

Hematology Objectives
A number of specific objectives subtend the overall goal. These objectives are presented below, organized by the general competencies defined by the Accreditation Council for Graduate Medical Education (ACGME) and the Pathology Residency Review Committee (RRC) as expected of all residents.

Patient Care
The resident will demonstrate ability to:

- Gather appropriate and accurate clinical information
- Interpret laboratory test results within the clinical context
- Use clinical decision-making concepts and techniques in interpreting results
- Advise clinicians on the choice of clinically appropriate, cost-effective tests
- Advise clinicians on appropriate follow-up for unexpected test results

Medical Knowledge
The resident will demonstrate:

- Knowledge of common hematology tests and their medical application and correlation
- Knowledge of the effects of anticoagulants, specimen collection techniques, aging of specimens, and fixatives on the various analytical techniques used in the hematology laboratory
- Ability to collect and evaluate medical evidence regarding the utility of laboratory tests
- Ability to use a variety of resources to investigate clinical questions
- Development of a personal strategy to maintain and update medical knowledge regularly

Practice-Based Learning and Improvement
The resident will demonstrate:

- Ongoing identification and remediation of gaps in personal medical knowledge
- Understanding and ability to apply the principles of quality control and quality assurance
- Ability to evaluate current and proposed testing methods for analytical performance, clinical utility and cost-effectiveness
- Use of proficiency-testing results to improve laboratory practice
- Ability to use laboratory problems and clinical inquiries to identify process improvements that may minimize opportunities for medical errors

Interpersonal and Communication Skills
The resident will demonstrate:

- Ability to communicate clearly and effectively with clinicians, medical technologists and other medical personnel
- Ability to use appropriate modes of communication (direct, telephone, e-mail, written)
- Ability to prepare and deliver effective presentations, including presentation of pathologic findings at a biweekly Hematopoietic Malignancy Clinical Care Conference

Professionalism
The resident will demonstrate:

- Knowledge and understanding of ethical and privacy issues affecting the clinical laboratory
- Maintenance of confidentiality of patient information
- Respectful behavior towards all patients and medical personnel
- Prompt and courteous response to all pager and telephone calls

- Regular, punctual attendance and participation in rounds, conferences, meetings and rotation responsibilities

Systems-based Practice
The resident will demonstrate:

- Understanding of the role of the laboratory in the health care system, and the importance of reliable, cost-effective and timely laboratory results in clinical decision-making
- Ability to work with clinicians, administrators and others to determine the role of the laboratory in specific situations to optimize patient outcomes
- Understanding of CLIA, CAP and JCAHO requirements for clinical laboratories
- Understanding of basic laboratory reimbursement mechanisms and regulatory requirements, including kickbacks and compliance with Medicare/Medicaid "fraud and abuse" avoidance requirements
- Ability to do cost analysis of laboratory tests

First-Year Genetics Rotation Goal
The goal of the Genetics rotation is to provide a set of tools that will enable the resident to develop an understanding of genetic disorders, inheritance patterns, mutational mechanisms, testing issues, and molecular laboratory techniques used for testing.

Genetics Objectives
The objectives are presented below, organized by the general competencies defined by the Accreditation Council for Graduate Medical Education (ACGME) as expected of all residents.

Patient Care
The resident will demonstrate ability to:

- Gather appropriate and accurate clinical information
- Interpret laboratory test results within the clinical context
- Use clinical decision-making concepts and techniques in interpreting results
- Advise clinicians on choice of clinically appropriate, cost-effective tests
- Advise clinicians on appropriate follow-up for unexpected test results

Medical Knowledge
The resident will demonstrate:

- Knowledge of selected examples of common clinical genetics tests and their medical application and correlation
- Knowledge of the characteristics and limitations of major laboratory techniques used for genetic testing
- Knowledge of the mutational mechanisms in human genetic disease
- Ability to collect and evaluate medical evidence related to test selection, interpretation, and reporting, such as mode of inheritance, penetrance, expressivity, genotype/phenotype correlation
- Ability to use a variety of resources to investigate clinical and molecular genetics questions
- Development of a personal strategy to regularly maintain and update medical knowledge

Practice-Based Learning and Improvement
The resident will demonstrate:

- Ongoing identification and remediation of gaps in personal medical genetics knowledge
- Understanding and ability to apply the principles of quality control and quality assurance

- Use of proficiency-testing results to improve laboratory practice
- Ability to use laboratory problems and clinical inquiries to identify process improvements that may minimize opportunities for medical errors

Interpersonal and Communication Skills
The resident will demonstrate:

- Ability to communicate clearly and effectively with clinicians, medical technologists and other medical personnel
- Ability to use appropriate modes of communication (direct, telephone, e-mail, written)
- Ability to prepare and deliver effective presentations

Professionalism
The resident will demonstrate:

- Knowledge and understanding of ethical, privacy, social and psychological issues affecting genetic testing
- Maintenance of confidentiality of patient information
- Respectful behavior towards all patients and medical personnel
- Prompt and courteous response to all pager and telephone calls
- Regular, punctual attendance, and participation in rounds, conferences, meetings and rotation responsibilities

Systems-based Practice
The resident will demonstrate:

- Understanding of the role of the laboratory in the health care system, and the importance of reliable, cost-effective and timely laboratory results in clinical decision-making
- Ability to work with clinicians, administrators and others to determine the role of the laboratory in specific situations to optimize patient outcomes
- Understanding of CLIA, CAP and ACMG requirements that pertain to genetics laboratories

First-Year Transfusion Medicine Rotation Goal
The goals and objectives are presented below, organized by the general competencies defined by the Accreditation Council for Graduate Medical Education (ACGME) and the Pathology Residency Review Committee (RRC).

Patient Care
The resident will demonstrate ability to:

- Gather appropriate and accurate clinical information
- Interpret laboratory test results within the clinical context
- Advise clinicians on clinically appropriate and cost-effective choice, dose, and therapeutic monitoring of blood components for transfusion therapy
- Advise clinicians on the diagnosis and management of various immunohematologic disorders, including those related to pregnancy, solid organ, and hematopoietic stem cell transplantation
- Explain the current infectious and non-infectious risks and potential adverse events related to transfusion therapy, and advise clinicians on their appropriate management
- Advise clinicians on the use of alternatives to conventional transfusion therapy
- Understand the appropriate indications for therapeutic apheresis and phlebotomy
- Understand the risks and management of adverse reactions that may occur during blood donation

Medical Knowledge
The resident will demonstrate:

- Knowledge of basic principles of immunology, hematology, biochemistry, and genetics required for an understanding of transfusion medicine
- Knowledge of blood component preparation, storage, processing, and modification
- Knowledge of the metabolic and hemostatic complications of massive blood transfusion
- An understanding of the basic principles of apheresis technology
- A basic understanding of clinically significant blood cell antigens and antibodies
- Ability to understand the basic principles and evaluate medical evidence regarding the utility of various blood bank assays related to compatibility testing, immunohematologic diagnosis, and infectious disease testing

Practice-Based Learning and Improvement
The resident will demonstrate:

- Development of a personal strategy to regularly maintain and update medical knowledge·
- Understanding and ability to apply the principles of quality control and quality assurance
- Ability to evaluate current and proposed testing methods for analytical performance, clinical utility and cost-effectiveness
- Use of proficiency-testing results to improve laboratory practice
- Ability to use laboratory problems and clinical inquiries to identify process improvements that may minimize opportunities for medical errors

Interpersonal and Communication Skills
The resident will demonstrate:

- Ability to communicate clearly and effectively with the primary patient care team in the role of consultant on issues related to transfusion therapy and potential adverse events
- Ability to communicate clearly and effectively with medical technologists and other medical personnel
- Ability to use appropriate modes of communication (direct, telephone, e-mail, written)
- Ability to prepare and deliver effective presentations

Professionalism
The resident will demonstrate:

- Knowledge and understanding of ethical and privacy issues affecting the clinical laboratory
- Maintenance of confidentiality of patient information
- Respectful behavior towards all patients and medical personnel
- Prompt and courteous response to all pager and telephone calls
- Regular, punctual attendance and participation in rounds, conferences, meetings and rotation responsibilities

Systems-based Practice
The resident will demonstrate:

- Understanding of the role of the transfusion service laboratory in the health care system, and the importance of reliable, cost-effective and timely provision of blood components and laboratory test results in patient care and clinical decision-making
- Ability to work with clinicians, administrators and others to determine the role of the transfusion service laboratory in specific situations to optimize patient outcomes

- Understanding of CLIA, CAP and JCAHO requirements for transfusion service laboratories
- Understanding of basic laboratory reimbursement mechanisms and regulatory requirements
- Ability to do cost analysis of blood services, transportation, and laboratory tests

First-Year Virology Rotation Goal
First Year Virology Rotation Goal: Provide training that will enable residents to make efficient and effective use of diagnostic virology testing, and to provide useful interpretive information to clinicians, through the development of the following general competencies.

Patient Care
The resident will demonstrate ability to:

- Understand the medical aspects and considerations of testing for important viral diseases, including but not limited to HIV, Hepatitis A, B, and C, herpes simplex, viral encephalitis, viral gastroenteritis, measles, mumps, rubella, parvovirus, respiratory viruses, cytomegalovirus, varicella zoster virus, and human herpesviruses-6, -7, and -8.
- Learn which stat or emergent diagnostic procedures for acute viral infections are useful and/or essential.

Medical Knowledge
The resident will demonstrate:

- Become familiar with the procedures and techniques used in medical diagnostic virology, including but not limited to primary specimen processing, tissue culture, cytopathic effect evaluation, fluorescent antibody staining and evaluation, and serologic testing.
- Become familiar with procedures and techniques used in newer aspects of virology testing, including but not limited to Western blotting for HIV and HSV, antigenemia testing for CMV, drug sensitivity testing for HIV and HSV, and polymerase chain reaction-based virology testing.

Practice-Based Learning and Improvement
The resident will demonstrate:

- Learn to interpret results of virology testing, through interaction with laboratory personnel and faculty.
- Demonstrate ability to critically evaluate the scientific literature regarding viral disease and testing, and to compare existing lab practices with proposed improvements.

Interpersonal Communication and Skills
The resident will demonstrate:

- Learn to provide useful consultative and interpretive service regarding virology testing to outside physicians, through coverage of the UW Virology on-call service.
- Demonstrate ability to team effectively with laboratory technologists and other professional associates.

Professionalism
The resident will demonstrate ability to:

- Perform all tasks in a professional, ethical, and sensitive manner.

Systems-based Practice
The resident will demonstrate ability to:

- Understand the role of virology testing in the larger context and system of health care, and be able to use laboratory resources to provide care that is of optimal value.

First-Year Immunology Rotation Goal
1. Electrophoresis & Immunofixation-Serum and Urine
    Indications:
    Multiple myeloma
    Waldenstrom's macroglobulinemia
    B-cell lymphomas
    Amyloidosis
    Peripheral neuropathies
    Alpha-1-antitrypsin visualization
    Other
    Pattern interpretations:
    M-spike: **MGUS, Malignancy**
    Acute phase response
    Chronic inflammation
    Nephrotic syndrome/protein loss
    Hemolysis: **In vitro, In vivo**
    Chronic liver disease
    Urine nephrotic syndrome
    Urine tubular proteinuria
    Urine Bence-Jones protein
    Urine oligoclonal 'stepladder' pattern
    Clinical correlations:
    CSF electrophoresis & CSF Leak
    Normal pattern
    Oligoclonal banding
    CSF-specific transferring immunofixation
    Method evaluation and troubleshooting

2. Autoimmunity
    Immunofluorescence:
    ANA
    ANCA
    Cytoplasmic fluorescence
    Other testing :
    ANA subsets
    AntiGBM
    ANCA specific antigen tests
    Antiphospholipid antibodies
    Organ-specific autoantibodies: **Thyroid, Celiac disease, Pernicious anemia, Others**
    Immune complex assays
    Rheumatoid factor
    Complement assays
    Indications for testing
    Clinical interpretation
    Method evaluation and troubleshooting

3. Tumor markers
    Specific antigens:
    CEA
    CA27.29/CA15-3
    PSA
    CA125
    HCG
    AFP
    Others
    Indications for testing
    Clinical interpretations
    Method evaluation and troubleshooting

4. Protein Quantitation
    Nephelometric techniques
    Immunodiffusion quantitative techniques
    Specific proteins
    CRP, nutrition markers, apolipoproteins, Immunoglobulins, alpha-1-antiprotease/antitrypsin, rheumatoid factor, complement factors, others
    Indications for testing
    Clinical interpretations
    Method evaluation and troubleshooting

5. Immunodeficiency
    Principles of evaluation
    Principles of testing
    Clinical examples

Responsibilities:

1. Evaluate history, physical findings and laboratory data for selected patients to help interpret clinical immunology laboratory testing.
2. Complete a literature review or small project on a selected topic. Present in-service on findings to technologists at Immunology lab.
3. Become familiar with major types of Immunology instrumentation. Review instrumentation with technologists and discuss technologies with faculty.
4. Review selected topics in clinical coagulation with faculty.
5. Attend the following conferences:
    - Electrophoresis sign-out (MWF 11 am, possibly 3:30)
    - Laboratory Medicine Grand Rounds (Wed 3:30)
    - Laboratory Medicine Research and Development Conference (Wed 2:30)
    - Laboratory Medicine Call Rounds (Wed, noon)
    - Medical Grand Rounds (Thurs noon)
    - Rheumatology Inpatient Rounds (optl) (Tu 9:15, Fr 8 x-ray, 10 clinical)
    - Rheumatology journal club (optional) (Tu 8)
    - Immunology conference (optional) (M 3:30)