MLT 114L - Clinical Coagulation Lab

Approval Date:  Effective Term: 

Department: MEDICAL LABORATORY TECHNICIAN  
Division: Allied Health/Public Safety  
Units: 0.75  
Grading Option: Letter Grade  
Transferability: CSU Transferable  
Course is: AA/AS Degree  
Repeatability:  
Contact Hours per Term:  
Lab: 2.25  
Associate Degree GE Applicability: No  
Recommended Class Size: 15  
-Rationale: Station limitations.

Discipline/Minimum Qualifications:

Catalog Description:  
Introduces the techniques and safety procedures used in the clinical coagulation laboratory, emphasizing platelet function tests and intrinsic and extrinsic clotting pathway testing.

Schedule Description:  
Introduces the techniques and safety procedures used in the clinical coagulation laboratory, emphasizing platelet function tests and intrinsic and extrinsic clotting pathway testing.

Student Learning Outcome:  
1. Explain the criteria of an acceptable specimen, including all preanalytical variables that could affect the results.

Course Objectives:  
1. Apply the use of Standard Precautions as they apply in the Coagulation laboratory according to Occupational Safety and Health Administration (OSHA) mandates.  
2. Demonstrate safe use and disposal of biohazardous materials.  
3. Define the Coagulation department's specimen collection procedure requirements for an acceptable specimen.  
4. Discuss and demonstrate proper quality control in a Coagulation laboratory.  
5. Illustrate the anatomy and physiology of a thrombocyte (platelet).  
6. Discuss the patient variables that effect platelet function test results.  
8. Discuss the mechanism of action of the Prothrombin Time (PT) test.  
9. Discuss the mechanism of action of the Activated Partial Thromboplastin Time (APTT) test.
10. Compare and contrast the various instrument options for performing the PT, PTT, and Fibrinogen tests.
11. Defend the coagulation department specimen collection procedures and discuss how these can affect test results.
12. Relate the importance of the INR in monitoring anticoagulant (warfarin) therapy.
13. Describe specific factor assays and how they are used for diagnostic purposes. Include discussion of Activated Protein C Resistance (APCR) prevalence in Caucasian vs. Hispanic, African-American, Asian and Native American populations, inherited Protein C Deficiency in infants, prevalence of Factor V Leiden deficiency in African-Americans and Asians versus Europeans, and X-linked recessive disorder.
14. Discuss and demonstrate proper quality control in a coagulation laboratory.
15. Compare and contrast Factor VIII (Hemophilia A) disease and Factor IX (Hemophilia B) Disease.

Course Content Outline:

menstruation, or a family history involving abnormal bleeding.
2. Nosebleeds, or easy bruising tendencies
3. Family history of stroke or blood clots
E. The Ivy, Duke, and Simplate Bleeding Time tests.
1. Bleeding Time test.
2. The importance or unimportance of this test.
3. Factors that prolong and/or shorten a Bleeding Time.
4. Factors that interfere with the Bleeding Time.
5. Difference among these three bleeding time tests.
F. The mechanism of action of the Prothrombin Time (PT) test.
1. The extrinsic pathway of hemostasis.
2. Two major uses of the PT tests.
G. Mechanism of action of the Activated Partial Thromboplastin Time (APTT) test.
1. The intrinsic pathway of hemostasis.
2. The two major uses of the APTT test.
H. Coagulation department specimen collection procedures and how these can affect test results.
1. Important issues regarding the collection of specimens for coagulation testing.
2. Proper specimen collection
3. Relationship of specimen collection and anticoagulants to the specimen test results.
I. Instrument options for performing the PT, APTT, and Fibrinogen tests.
1. Endpoint detection on instrument methodologies: Mechanical, Photo-optical, Chromogenic.
   immunologic.
2. Advantages and disadvantages of each method.
J. The importance of the INR in monitoring anticoagulant (warfarin) therapy.
1. INR
2. International Sensitivity Index (ISI)
3. The INR calculation
3. Why the INR was developed
K. Specific factor assays and how they are used for diagnostic purposes. Includes discussion of Activated Protein C Resistance (APCR) prevalence in Caucasian versus Hispanic, African-American, Asian and Native American populations, inherited Protein C Deficiency in infants, prevalence of Factor V Leiden deficiency in African Americans and Asians versus Europeans, and X-linked recessive disorder of Facto rs VIII (Hemophilia A and IX (Hemophilia B).
1. Factor deficiencies by using pooled normal plasma when the PT is abnormal and corrects.
2. Factor deficiencies corrected by using pooled normal plasma when the APTT is abnormal and corrects.
3. Factor deficiencies corrected by using pooled normal plasma when both the PT and APTT and abnormal and corrected.
4. Causes, in mixing studies, when the pooled normal plasma does not correct the abnormal PT and/or APTT.
5. The principle of the Fibrinogen test, its normal reference range and its limitations.
6. The principle of the Fibrin Degradation Products (FDP) test, its normal reference range and its limitations.
8. The principle of the Thrombin Time (TT) test, its normal reference range and its limitations.

1. The importance and proper quality control in a hemostasis department.
2. The importance of running quality control material in the coagulation laboratory.
3. Quality control results and troubleshooting any "out of range" results.

A. Use of Standard Precautions as they apply in the Coagulation laboratory to Occupational Safety and Health Administration (OSHA) mandates.
1. Basic aspects of infection control policies including how and when to use personal protective equipment (PPE) or devices (gown, gloves, and goggles).
2. Safety by using PPE during all laboratory work with hazardous material.
4. The pre and post exposure prophylactic measures for handling the potential occupational transmission of certain pathogens.
5. Use of proper disinfectants to decontaminate the work area when a hazardous spill has occurred and when beginning or ending a laboratory session.
6. Basic steps of first-aid.
7. Location and description of following:
   a. Evacuation routes
   b. Biohazardous material
   c. Blood borne pathogens (BBP)
   d. Standard Precautions
   e. Aerosols
   f. Material Safety Data Sheets (MSDS)

B. Safe use and disposal of biohazardous materials.
1. Properly segregate and dispose of various types of waste products generated in the clinical laboratory, including the use of sharp containers for needles, lancets, and/or other sharps.
2. Proper disposal of biological samples as instructed.
C. The anatomy and physiology of the thrombocyte (platelet)
1. The platelet, the 3 zones/layers (Peripheral, Sol-gel, & Organelle) and their function.
2. Within each zone/layer label the major contents.
3. The changes the platelet undergoes during primary hemostasis.
4. Platelet adhesion and aggregation.
5. Laboratory tests associated with primary hemostasis.
6. The reference ranges for the above laboratory tests.
7. Correlate clinical manifestations with abnormal laboratory test results.
D. The pre-analytical questionnaire concerning patient variables that affect platelet function test results.
1. Abnormal bleeding after surgery, cutting yourself, during

**Methods of Instruction:**

Lab:

**Methods of Evaluation:**

Exams/Tests/Quizzes
Skill Demonstrations
Written Assignments

**Typical Assignments:**

Reading:
Textbook assignments Supplemental reference books Hand outs (lab procedures)

Writing, Problem Solving or Performance:
Problem solving for case studies Short essay answers for some exam questions Some calculations

Other:

**Required Materials**

**Examples:**

Book 1

**Author:** Turgeon, Mary Louise  
**Publication Date:** 2005  
**Edition:** 4th

**Title:** Clinical Hematology, Theory and Procedures  
**Publisher:** Lippincott, Williams & Wilkins

**Course Preparation:**

Prerequisite(s): None
Co-Requisite(s): MLT 114
Recommended: None