

## Component III: Clinical

### Module E: Laboratory Procedures

#### Topic 2: Collecting, Processing and Testing of Blood and Body Fluids

##### Statement of Purpose

To prepare the learner with the basic knowledge and skills necessary to collect, process and perform testing on blood and body fluids in the Physician's Office Laboratory setting.

##### Student Learning Outcomes

Upon completion of this topic, the learner will be able to:

1. Spell and define key terms.
2. Discuss the composition and function of blood.
3. Describe procedures for the collection of blood, urine, stool, sputum, throat and other bacteriological specimens.
4. Discuss common fears and concerns of patients and how to ease these fears.
5. Identify common blood tests and their purpose.
6. Perform waived tests.

##### Terminology

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|---|--|
| 1. Agglutination                        | 14. Hemolysis  |
| 2. Anticoagulant                        | 15. Leukocyte  |
| 3. Blood Urea Nitrogen (BUN)            | 16. Mean Cell Volume (MCV)                           |
| 4. Capillary puncture                   | 17. Mean Corpuscular Hemoglobin Concentration (MCHC) |
| 5. Coagulation                          | 18. Mean Corpuscular Hemoglobin (MCH)                |
| 6. Complete Blood Count (CBC)           | 19. Microbiology                                     |
| 7. Culture                              | 20. Morphology                                       |
| 8. Erythrocyte                          | 21. Occult   |
| 9. Erythropoietin                       | 22. Thrombocyte                                      |
| 10. Evacuated                           | 23. Transport media                                  |
| 11. Fecal occult blood testing supplies | 24. Venipuncture                                     |
| 12. Hematopoiesis                       |  |
| 13. Hemoglobin A1c                      |  |

##### References

1. Kronenberg, J., Southard D. L., & Woodson, D. (2012). *Comprehensive Medical Assisting* (4<sup>th</sup> Ed.). Philadelphia, PA: Lippincott, Williams & Wilkins.
2. Booth, K.A., Whicker, L.G., Wyman, T.D., & Moaney-Wright, S. (2011). *Medical Assisting: Administrative & Clinical Competencies with Anatomy and Physiology*. (4<sup>th</sup> Ed.). New York, NY: McGraw-Hill Company, Inc.

Content Outline/Theory Objectives	Suggested Learning Activities
<b>Objective 1</b> <b>Spell and define key terms.</b> <ul style="list-style-type: none"> <li>A. Review the terms listed in the terminology section.</li> <li>B. Spell the listed terms accurately.</li> <li>C. Pronounce the terms correctly.</li> <li>D. Use the terms in their proper context.</li> </ul>	<ul style="list-style-type: none"> <li>A. Games: word searches, crossword puzzles, Family Feud, Jeopardy, bingo, spelling bee, hangman and concentration.</li> <li>B. Administer vocabulary pre-test and post-test.</li> <li>C. Discuss learning gaps and plan for applying vocabulary.</li> </ul>
<b>Objective 2</b> <b>Discuss the composition and function of blood.</b> <ul style="list-style-type: none"> <li>A. Composition of blood               <ul style="list-style-type: none"> <li>1. Erythrocytes.</li> <li>2. Leukocytes.</li> <li>3. Thrombocytes.</li> <li>4. Plasma.</li> </ul> </li> <li>B. Production of blood               <ul style="list-style-type: none"> <li>1. Hematopoiesis in bone marrow.</li> </ul> </li> <li>C. Function of blood               <ul style="list-style-type: none"> <li>1. Transportation                   <ul style="list-style-type: none"> <li>a. Oxygen (oxyhemoglobin).</li> <li>b. Carbon dioxide (carboxyhemoglobin).</li> <li>c. Waste.</li> <li>d. Nutrients.</li> <li>e. Hormones.</li> <li>f. Enzymes.</li> <li>g. Electrolytes.</li> </ul> </li> <li>2. Regulation                   <ul style="list-style-type: none"> <li>a. pH.</li> <li>b. Temperature.</li> <li>c. Water content of cells.</li> </ul> </li> <li>3. Protection                   <ul style="list-style-type: none"> <li>a. Blood loss via clotting mechanisms.</li> <li>b. Foreign microbes via White Blood Cells (WBCs).</li> </ul> </li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>A. Lecture/Discussion</li> <li>B. Assigned Readings</li> </ul>
<b>Objective 3</b> <b>Describe procedures for the collection of blood, urine, stool, sputum, throat and other bacteriological specimens.</b> <ul style="list-style-type: none"> <li>A. Collection procedures/types               <ul style="list-style-type: none"> <li>1. Venipuncture                   <ul style="list-style-type: none"> <li>a. Evacuation systems.</li> <li>b. Needle and syringe systems.</li> <li>c. Winged/butterfly systems.</li> </ul> </li> <li>2. Capillary puncture.</li> <li>3. Urine                   <ul style="list-style-type: none"> <li>a. Clean catch mid-stream.</li> <li>b. Random.</li> </ul> </li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>A. Lecture/Discussion</li> <li>B. Assigned Readings</li> <li>C. Show samples of all types of equipment used in collection of the various body fluids.</li> <li>D. Students should perform actual collection procedures on each other.</li> <li>E. Videos on all collection</li> </ul>

<ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>c. 24 hour.</li> </ul> </li> <li>4. Stool/feces           <ul style="list-style-type: none"> <li>a. Random.</li> <li>b. 24 hour.</li> <li>c. Fecal occult blood.</li> </ul> </li> <li>5. Sputum           <ul style="list-style-type: none"> <li>a. Random.</li> <li>b. First morning.</li> </ul> </li> <li>6. Throat           <ul style="list-style-type: none"> <li>a. Random.</li> <li>b. Culturette.</li> </ul> </li> <li>7. Microbiology (all other)           <ul style="list-style-type: none"> <li>a. Random.</li> <li>b. Culturette.</li> <li>c. Transport media.</li> </ul> </li> </ul>	<p>procedure are available for students to review.</p> <p>F. Clinical laboratory personnel or manufacturer reps could be invited to demonstrate the proper use of the equipment.</p>
<p><b>Objective 4</b>  <b>Discuss common fears and concerns of patients and how to ease these fears.</b></p> <ul style="list-style-type: none"> <li>A. Common fears           <ul style="list-style-type: none"> <li>1. Pain.</li> <li>2. Physical harm/injury.</li> <li>3. Emotional/test results.</li> <li>4. Misunderstanding.</li> </ul> </li> <li>B. Reducing fears           <ul style="list-style-type: none"> <li>1. Explanation of procedure.</li> <li>2. Knowledge of equipment.</li> <li>3. Assessment of patient age, emotional and physical condition.</li> <li>4. Language barriers addressed.</li> <li>5. Professional attitude.</li> <li>6. Compassion.</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>A. Lecture/Discussion</li> <li>B. Assigned Readings</li> <li>C. Stress realistic fears of patients having invasive procedures performed and relate them to self.</li> <li>D. Discuss the ramifications to the patient of abnormal test results and the implications.</li> <li>E. Discuss professional attitude and manners and how this can lessen patient apprehension.</li> <li>F. Discuss misunderstanding that can be present because of language barriers.</li> </ul>

**Objective 5****Identify common blood tests and their purpose.**

- A. Common blood tests
  - 1. Hematologic studies
    - a. Complete Blood Count (CBC).
    - b. Red Blood Cell (RBC) count.
    - c. White Blood Cell (WBC) count.
    - d. Differential WBC count.
    - e. Platelet count.
    - f. Hematocrit determination.
    - g. Hemoglobin determination.
    - h. Mean Cell Volume (MCV).
    - i. Mean Corpuscular Hemoglobin (MCH).
    - j. Mean Corpuscular Hemoglobin Concentration (MCHC).
    - k. Morphologic studies.
- B. Coagulation tests.
- C. Erythrocyte Sedimentation Rate (ESR).
- D. Chemistry panels
  - 1. Glucose.
  - 2. Hemoglobin A1c.
  - 3. Blood Urea Nitrogen (BUN).
  - 4. Creatinine.
  - 5. Proteins.
  - 6. Electrolytes.
  - 7. Cardiac enzymes.
  - 8. Liver enzymes.
  - 9. Cholesterol/Lipids.
- E. Serologic tests
  - 1. Antigens.
  - 2. Antibodies.
  - 3. Hormone levels.

- A. Lecture/Discussion
- B. Assigned Readings
- C. Lectures can be given by clinical laboratory technologists on the testing done and implications of the results.
- D. Set up tours and interviews in the clinical laboratory setting.

- 8. Catalase, a rapid diagnostic test based on the
- B. Blood tests
  - 1. Erythrocyte sedimentation rate (ESR), non-automated.
  - 2. Hemoglobin by copper sulfate, non-automated.
  - 3. Spun microhematocrit.
  - 4. Blood glucose (using devices approved by the FDA for home use.)
  - 5. Hemoglobin by single analyte instruments, automated.
  - 6. Prothrombin time.
  - 7. Platelet aggregation.
  - 8. Ketones in whole blood, over the counter test only.
  - 9. Total cholesterol, high density lipoprotein (HDL), low density lipoproteins (LDL) and triglycerides.
  - 10. Hemoglobin A1c.
  - 11. Lactate in whole blood.
  - 12. Lead in whole blood.
  - 13. Thyroid stimulating hormone, rapid test.

- A. Lecture/Discussion
- B. Assigned Readings
- C. Have available all test kits, reagents, package inserts and equipment necessary to practice performing the tests.
- D. Practice performing the test procedures using the package inserts as directions and develop specific methods for accurate performance of the tests.
- E. Discuss advantages and disadvantages of different types of tests.
  - 1. Include patient

<ul style="list-style-type: none"> <li>14. Mononucleosis rapid test.</li> <li>15. Helicobacter pylori rapid antibody test.</li> <li>16. Lyme disease antibodies.</li> <li>17. HIV antibody test.</li> <li>C. Fecal tests, fecal occult blood.</li> <li>D. Saliva tests, alcohol.</li> <li>E. Nasal smear tests <ul style="list-style-type: none"> <li>1. Influenza A and B antigens.</li> <li>2. Respiratory syncytial virus.</li> </ul> </li> <li>F. Vaginal smear tests <ul style="list-style-type: none"> <li>1. Trichomonas vaginalis antigens.</li> <li>2. Vaginal pH.</li> </ul> </li> <li>G. Throat swab tests <ul style="list-style-type: none"> <li>1. Strep A antigens.</li> <li>2. Influenza A and B.</li> </ul> </li> <li>H. Semen, sperm concentration, home screening.</li> </ul>	<ul style="list-style-type: none"> <li>preparation</li> <li>2. Ease of test performance</li> <li>3. Accuracy of the test results</li> </ul>
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