

MLT-1491: URINALYSIS AND BODY FLUIDS

Cuyahoga Community College

Viewing: MLT-1491 : Urinalysis and Body Fluids

Board of Trustees:

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Academic Term:

Spring 2021

Subject Code

MLT - Medical Laboratory Technology

Course Number:

1491

Title:

Urinalysis and Body Fluids

Catalog Description:

Theory and application of urine and body fluid analysis. Includes the anatomy and physiology of the kidney, physical, chemical and microscopic examination of the urine, cerebrospinal and other body fluids. Also includes diagnostic significance of test results and correlation with disease states, quality control, quality assurance and safety.

Credit Hour(s):

3

Lecture Hour(s):

2

Lab Hour(s):

3

Requisites

Prerequisite and Corequisite

MLT-1000 Introduction to Medical Laboratory Technology or departmental approval: related work experience.

Outcomes

Course Outcome(s):

A. Demonstrate safe and accountable behaviors within the laboratory setting.

Objective(s):

1. 1. Demonstrate knowledge of proper personal protective equipment (PPE) use and universal precautions.

Course Outcome(s):

D. Describe the processes of urine and body fluid sample collection and storage of specimens of test results.

Objective(s):

1. 2. Describe the proper protocol for collection of cerebral spinal fluid (CSF) for various tests.
 2. 1. Describe the proper protocol for collection of cerebral spinal fluid (CSF) for various tests.
 3. 1. Describe the appropriate directions for random and timed collections of urine.
 4. 1. Describe the appropriate directions for random and timed collections of urine.
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Course Outcome(s):

E. State the effects of inappropriate collection and storage on urinalysis and body fluid results.

Objective(s):

1. 1. Describe the function of various additives for urine collections, and impact on test results.
2. 1. Describe the function of various additives for urine collections, and impact on test results.

3. 2. Describe the impact of improper collection and storage of CSF, and other body fluids where applicable.
4. 1. Describe the impact of improper collection and storage of CSF, and other body fluids where applicable.

Course Outcome(s):

F. Describe, perform, and assess the physical, chemical, and microscopic examination of urine and correlate the results to normal and abnormal renal and non-renal conditions.

Objective(s):

1. 1. Assess the color and clarity of samples employing the correct terminology and propose appropriate confirmatory testing.
2. 1. Assess the color and clarity of samples employing the correct terminology and propose appropriate confirmatory testing.
3. 2. State the reference ranges for chemical and microscopic components of the urinalysis.
4. 1. State the reference ranges for chemical and microscopic components of the urinalysis.
5. 3. Analyze sediment and identify the casts, crystals, organisms, artifacts, cells, and other items found in urine.
6. Analyze sediment and identify the casts, crystals, organisms, artifacts, cells, and other items found in urine.
7. 4. Perform the dipstick/chemical methods in an orderly, efficient manner, being conservative with supplies.
8. 1. Perform the dipstick/chemical methods in an orderly, efficient manner, being conservative with supplies.
9. 5. State the principles of the test pads on the various common chemical urine dipsticks/confirmatory tests.
10. 1. State the principles of the test pads on the various common chemical urine dipsticks/confirmatory tests.
11. 6. Correlate physical and chemical results with microscopic, and recognize and resolve discrepancies.
12. 1. Correlate physical and chemical results with microscopic, and recognize and resolve discrepancies.

Course Outcome(s):

G. Compare and contrast the principle of urinalysis methods including sensitivity, specificity, and sources of error .

Objective(s):

1. 1. Compare and contrast the chemical tests on various brands of dipsticks.
2. 1. Compare and contrast the chemical tests on various brands of dipsticks.
3. 2. Discuss the principle of each confirmatory test and indicate appropriate selection of each.
4. 1. Discuss the principle of each confirmatory test and indicate appropriate selection of each.
5. 3. Describe the principle of the refractometer.
6. Describe the principle of the refractometer.
7. 4. Discuss various automated analyzers.
8. 1. Discuss various automated analyzers.

Course Outcome(s):

H. Perform and evaluate quality control/assurance procedures used in analysis of urines and body fluids .

Objective(s):

1. 1. Analyze QC results using critical thinking skills and select appropriate course of action.
2. 1. Analyze QC results using critical thinking skills and select appropriate course of action.
3. 2. Recognize appropriate preparation, handling and storage of quality control (QC).
4. 1. Recognize appropriate preparation, handling and storage of quality control (QC).

Course Outcome(s):

I. Describe the methods used in routine body fluid analyses and correlate results with normal and disease states.

Objective(s):

1. 1. Assess the appearance of samples, employing the correct terminology and explain the cause.
2. 1. Assess the appearance of samples, employing the correct terminology and explain the cause.
3. 2. Describe manual methods of counting and pre-treating.
4. 1. Describe manual methods of counting and pre-treating.
5. 3. Describe automated methods of counting and chemical analysis.
6. 1. Describe automated methods of counting and chemical analysis.

Course Outcome(s):

J. Identify formed elements in urines and body fluids and correlate to normal and abnormal states.

Objective(s):

1. 1. Identify the major characteristics of crystals including color, solubility, polarization and relationship of pH to crystals.
2. 1. Identify the major characteristics of crystals including color, solubility, polarization and relationship of pH to crystals.
3. 2. Identify types of casts, blood cells, tissue cells, parasites/organisms, artifacts, mucous, and others.

4. Identify types of casts, blood cells, tissue cells, parasites/organisms, artifacts, mucous, and others.

Course Outcome(s):

B. Demonstrate knowledge of the anatomy and physiology of the urinary tract and organs.

Objective(s):

1. 2. Perform correct disposal of specimen, chemical and biohazardous materials.
2. 1. Perform correct disposal of specimen, chemical and biohazardous materials.
3. 1. Identify the components of the urinary system.
4. 1. Identify the components of the urinary system.
5. 2. Describe the function of each urinary system component.
6. Describe the function of each urinary system component.
7. 3. Describe the renal threshold; identify the threshold for glucose.
8. 1. Describe the renal threshold; identify the threshold for glucose.

Course Outcome(s):

K. Describe miscellaneous body fluid testing such as feces, sweat, osmometry, porphyrins.

Objective(s):

1. 1. Summarize the principles of methodologies.
2. 1. Summarize the principles of methodologies.
3. 2. Indicate sources of error.
4. 1. Indicate sources of error.
5. 3. Correlate test results with clinical significance.
6. 1. Correlate test results with clinical significance.

Course Outcome(s):

C. Demonstrate knowledge of non-urine body fluids such as synovial, cerebrospinal, serous, amniotic, and seminal fluids.

Objective(s):

1. 1. Describe the formation of each.
2. 1. Describe the formation of each.
3. 2. Describe the composition of each.
4. 1. Describe the composition of each.
5. 3. Describe the function of each.
6. 1. Describe the function of each.

Methods of Evaluation:

1. Participation/Discussion
2. Quizzes
3. Training Presentation
4. Case Study Presentation
5. Homework assignments/Practice Problems
6. Lab exercises/Reports/Mind Stretchers
7. Written lecture and lab final
8. Final lab practical

Course Content Outline:

1. Laboratory Safety
 - a. Universal Precautions, statutes, PPE
 - b. Location and use of safety equipment
 - c. Disinfection and disposal of contaminated materials
2. Kidney
 - a. Anatomy and Physiology
 - b. Urine formation and composition
 - c. Renal diseases
3. Urine Formation

- a. Composition
- b. Volume
4. Specimen Collection and Handling
 - a. Storage
 - b. Preservatives
 - c. Changes in unpreserved specimens
 - d. Types of specimens
5. Physical Examination of Urine
 - a. Color
 - b. Appearance
 - c. Specific Gravity
6. Reagent strips
 - a. Technique
 - b. Quality Control
 - c. Storage and Handling
 - d. Compare methods of varying manufacturers
7. Chemical Examination of Urine, including the following for each test: principle of reactions, sources of error, normal ranges, interpretation of results and clinical significance of abnormal results, confirmatory tests for the following:
 - a. Protein
 - b. Glucose
 - c. Ketones
 - d. Blood
 - e. Bilirubin
 - f. Urobilinogen
 - g. Nitrite
 - h. Leukocytes
 - i. Others: myoglobin, free fat
8. Microscopic Examination of Urine including normal ranges, interpretation of results and clinical significance of abnormal results, confirmatory tests for the following:
 - a. Specimen Preparation
 - b. Cells
 - c. Casts
 - d. Bacteria, Yeast and Parasites
 - e. Spermatozoa and Mucous
 - f. Crystals
 - g. Artifacts
9. Quality Assurance
 - a. Quality control
 - b. Confirmatory testing
 - c. Correlation of chemical and microscopic
10. Abnormal Metabolic Substances
 - a. Overflow
 - b. Renal
11. Errors of Phenylalanine-Tyrosine Pathway
 - a. Phenylketonuria
 - b. Tyrosinuria
 - c. Alkaptonuria
 - d. Melanuria
12. Additional Amino Acid Disorders
 - a. Maple Syrup Disease
 - b. Hartnup Disease
 - c. Indicanuria
 - d. Cystinuria
13. Porphyrin Disorders
14. Fecal Analysis
15. Other Types of Body Fluid and their Collection

- a. Amniotic Fluid
 - i. Appearance
 - 1. Normal
 - 2. Abnormal
 - ii. Function
 - iii. Tests performed and their clinical diagnostic significance
 - 1. Chromosomal Analysis
 - 2. Screening of Neural Tube Defects
 - 3. Bilirubin
 - 4. LS Ratio
 - 5. Foam Stability Index
 - b. Cerebrospinal Fluid
 - i. Appearance
 - 1. Normal
 - 2. Abnormal
 - ii. Function
 - iii. Tests performed and their clinical diagnostic significance
 - 1. Chemistry
 - a. Glucose
 - b. Total Protein
 - c. Specific Proteins
 - 2. Microscopic Analysis: Hematology WBC/RBC, Microbiology
 - c. Synovial Fluid
 - i. Appearance
 - ii. Function
 - iii. Tests performed and their clinical diagnostic significance
 - 1. Glucose
 - 2. Microscopic Analysis
 - d. Pleural Fluid
 - i. Appearance
 - ii. Function
 - iii. Tests Performed and their clinical diagnostic significance
 - 1. Microbiology
 - 2. Microscopic Analysis
 - 3. Chemistry
 - a. Total Protein
 - b. LDH
 - c. Glucose
 - d. Amylase
 - e. Triglyceride
 - f. pH
 - e. Peritoneal Fluid
 - i. Appearance
 - ii. Function
 - iii. Tests performed and their clinical significance
 - f. Semen Analysis
 - i. Appearance
 - ii. Tests performed and their clinical significance
16. Equipment Usage Overview and Troubleshooting
- a. Microscope
 - b. Centrifuge
 - c. Refractometer
17. Automation

Resources

Free, H. M., ed. *Modern Urine Chemistry: Application of Urine Chemistry and Microscopic Examination in Health and Disease*. Bayer, 2004.

Mundt, Lillian and Shanahan, Kristy. *Graff's Textbook of Urinalysis and Body Fluids*. 2nd ed., Philadelphia: Wolters Kluwer/LWW, 2011.

Strasinger, S. K. *Urinalysis and Body Fluids*. 5th ed. Philadelphia: F. A. Davis, 2008.

Jarreau, Patsy. *Clinical Laboratory Science Review: A Bottom Line Approach*. 3rd ed. Jefferson, LA: Louisiana State University Health Sciences Center Foundation, 2005.

Turgeon, Mary Louise. *Linne Ringsrud's Clinical Laboratory Science, The Basics and Routine Techniques*. 5th ed.,. St. Louis: Mosby/Elsevier, 2007.

Campbell, Joe. *Laboratory Mathematics*. 5th edition. St. Louis: Mosby/Elsevier, 1997.

Doucette, Lorraine J. *Mathematics for the Clinical Laboratory*. 2nd ed.,. Maryland Hts., MO: Saunders/Elsevier, 2011.

Brunzel, Nancy. *Fundamentals of Urine Body Fluid Analysis*. 2nd ed.,. Philadelphia: Saunders/Elsevier, 2004.

Instructional Services

OAN Number:

Transfer Assurance Guide OHL010

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