Component III: Clinical

Module E: Laboratory Procedures

Topic 4: Collecting, Processing and Testing of Microbiology Specimens

Statement of Purpose
To prepare the learner with basic knowledge and skills necessary to properly collect and process microbiology specimens.

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

1. Spell and define key terms.
2. Describe how microorganisms cause disease.
3. Explain how microbial pathogens differ and give examples of each.
4. Describe the general guidelines for collection of bodily fluids for microbiological cultures.
5. Explain how specimens should be transported to outside laboratories.

Terminology

1. Aerobic
2. Agar
3. Anaerobic
4. Bacilli/bacillus
5. Bacteriology
6. Cocci/coccus
7. Culture
8. Fungi/fungus
9. Gram negative
10. Gram positive
11. Infestation
12. Inoculate
13. KOH prep
14. Media
15. Morphology
16. Mycology
17. Normal flora
18. Nosocomial (hospital acquired infection)
19. Opportunistic
20. Parasite
21. Pathogen
22. Prion
23. Qualitative
24. Quantitative
25. Resistant
26. Sensitive
27. Smear
28. Spirilla/spirillum
29. Staphylococci
30. Streptococci
31. Swab
32. Vector
33. Vibrios/vibrio
34. Virus

References

1. Kronenberger, J., Southard D. L., & Woodson, D. (2012). *Comprehensive Medical Assisting* (4th 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. (4th Ed.).* New York, NY: McGraw-Hill Company, Inc.

Content Outline/Theory Objectives	Suggested Learning Activities
Objective 1 **Spell and define key terms.** A. Review the terms listed in the terminology section. B. Spell the terms listed accurately. C. Pronounce the terms correctly. D. Use the terms in their proper context.	A. Games: word searches, crossword puzzles, Family Feud, Jeopardy, bingo, spelling bee, hangman and concentration. B. Administer vocabulary pre-test and post-test. C. Discuss learning gaps and plan for applying vocabulary.
Objective 2 **Describe how microorganisms cause disease.** A. Pathogenic organisms 1. Use up nutrients needed by cells and tissues for survival. 2. Reproduce within cells causing destruction of cells. 3. Body cells become targets of the body's own defense mechanism. 4. Produce toxins which damage cells and tissues. 5. Alter cellular DNA.	A. Lecture/Discussion B. Assigned Readings
Objective 3 **Explain how microbial pathogens differ and give examples of each.** A. Prions 1. Infectious particle made of protein. 2. Very small. 3. No nucleic acid. 4. Reproduction unknown. 5. Diseases *a.* Creutzfeldt-Jakob Disease (CJD). *b.* Bovine Spongiform Encephalopathy (BSE)/Mad Cow Disease. B. Virus 1. Nonliving/acellular nucleic acid surrounded by a protein coat. 2. Very small. 3. Reproduce, live and grow only within living cells of other organisms. 4. Diseases *a.* Common cold. *b.* Influenza. *c.* Herpes 1 and 2. *d.* Varicella zoster (Chicken pox). *e.* Hepatitis A, B, C and D. *f.* Warts/HPV. *g.* HIV/AIDS.	A. Lecture/Discussion B. Assigned Readings

h. Mumps. *i.* Measles. *j.* Rabies. *k.* Rubella. *l.* Small pox. *m.* Poliomyelitis. *n.* Encephalitis. C. Bacteria 1. Single cell prokaryotic. 2. Rapid reproduction. 3. Mostly asexual reproduction. 4. Identified by gram stain (positive or negative.) 5. Identified by shape/morphology *a.* Coccus/cocci are round, ovoid or spherical. *b.* Bacillus/bacilli, rod shaped. *c.* Spirillum/spirilla, spiral shaped. *d.* Vibrio/vibrios, comma shaped. 6. Ability to grow in the presence or absence of oxygen (aerobic/anaerobic). 7. Special groups of bacteria *a.* Mycobacteria. *b.* Rickettsia. *c.* Chlamydiae. *d.* Mycoplasma. D. Fungi 1. Eukaryotic. 2. Yeast *a.* Single celled. *b.* Budding reproduction. 3. Molds *a.* Multicellular. 4. Superficial infections *a.* *Tinea pedis*/Athlete's foot. *b.* *Tinea corporis*/Ringworm. *c.* Oral candidiasis/Thrush. *d.* Vaginal candidiasis/Vaginal yeast infections. 5. Life-threatening illness-internal tissue invaded *a.* *Pneumocystis carinii* pneumonia. Causative organism has been renamed *Pneumocystis jiroveci.* E. Protozoans 1. Eukaryotic. 2. Single celled. 3. Reproduction is mostly asexual. 4. Larger than bacteria. 5. Diseases *a.* Malaria. *b.* Trichomoniasis. *c.* Giardiasis. F. Parasites	

1. Eukaryotic. 2. Complete organism. 3. Live on or in another organism. 4. Dependent on another organism for its own nourishment. 5. Potentially detrimental to the host organism. 6. Parasitic infestations *a.* Parasitic worms 1) Round. 2) Flat. 3) Tape. *b.* Parasitic insects (Vectors) 1) Mosquitoes; West Nile, Malaria. 2) Ticks, Lyme disease. 3) Lice, pediculosis. 4) Mites, Scabies.	
Objective 4 **Describe the general guidelines for collection of bodily fluids for microbiological cultures.** A. Greet and identify the patient. B. Wash hands and put on appropriate PPE. C. Adhere to standard precautions. D. Collection guidelines 1. Collect specimens with care to avoid harm, discomfort or embarrassment to the patient. 2. If a patient is to collect specimen, give clear detailed instructions along with the proper container. 3. Collect a specimen from the area where organism is most likely to be found and contamination is least likely to occur. 4. Collect a specimen at a time when optimal recovery of the organism can be expected. 5. Use appropriate collection devices, specimen containers, transport systems and culture media. 6. Obtain appropriate quantity of specimen necessary to perform the requested procedures. 7. Obtain specimen before antimicrobial therapy begins. If patient is already on antimicrobial therapy, place note in chart. 8. Label the collection container or device a. Patient name and ID number. b. Source (collection site of specimen). c. Date and time of collection. d. Physician name. e. Your initials. 9. Fill out and include the appropriate requisition form a. Patient name and ID number. b. Patient address. c. Patient date of birth and gender.	A. Lecture/Discussion B. Assigned Readings C. Have available all types of collection containers and collection devices for student practice. D. Have students practice collection procedures on each other. E. Have students complete requisition forms and practice giving patient instructions while role playing.

d. Patient's insurance billing information. e. Type and source of microbiological specimen. f. Date and time of specimen collection. g. Test requested. h. Medications patient is currently receiving. i. Physician's presumptive diagnosis. j. Physician's name, address, and phone number. k. Special instructions.	
Objective 5 **Explain how specimens should be transported to outside laboratories.** A. Specimen transportation 1. Follow the proper collection procedures and use the proper collection device. 2. Follow packing directions from the laboratory that will receive and test the specimen. 3. Maintain the samples/specimens in a state as close to original as possible to prevent deterioration. 4. Protect anyone who handles a specimen container from exposure to potentially infectious material. B. Methods of transportation 1. Regularly, scheduled daily pickups by the laboratory. 2. As-needed pick up by the laboratory. 3. Through the mail a. CDC procedures based on U.S. Public Health Service regulations must be followed. b. Packages containing microbiological specimens must have a total volume less than 50 mL. c. Special secure mailing containers and labels.	A. Lecture/Discussion B. Assigned Readings C. Have available all collection containers and devices supplied by reference laboratories for student practice. D. Have students practice preparing specimens for transport to outside laboratories. E. Have postal mailing containers and labels available for processing and mailing specimens.