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MULTIPLE CHOICE

1. A 78-year-old man is being prepared for discharge following abdominal surgery, which he underwent several days ago. The nurse notices that the patient has a temperature of 101.5°F and has some tan secretions in his suture area. A specimen is sent to the laboratory. The results show the presence of Gram-positive cocci. The statement that might explain this condition is which of the following?
   a. The antibiotic was ineffective.
   b. The patient was not compliant with therapy.
   c. It is normal to have secretions at the suture site.
   d. A health care–associated infection should be considered.

   ANS: D
   No antibiotic was mentioned in the scenario. There is no history of the patient receiving any medication for this problem, so compliance is not an issue with this situation. It is not normal to have secretions at a suture site.

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2. A nosocomial infection is best defined as a
   a. respiratory system–borne pathogen.
   b. hospital-acquired pathogen.
   c. bacterial or viral organism.
   d. blood-borne pathogen.

   ANS: B
   A nosocomial infection is one that is acquired in a hospital setting. Respiratory system–borne pathogens and blood-borne pathogens can be acquired in the community.

   PTS: 1 REF: Page 25

3. Infectious diseases are typically caused by which of the following?
   1. Ticks
   2. Bacteria
   3. Viruses
   4. Algae
   a. 1 and 4
   b. 2 and 3
   c. 1, 2, and 4
   d. 1, 2, and 3

   ANS: D
   Algae do not cause infectious diseases. Infectious diseases can be caused by ticks, bacteria, and viruses.

   PTS: 1 REF: Page 29, Table 2.3

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4. Clinical microbiology is concerned with _____ the organism.
   1. identifying
   2. controlling
   3. isolating
   4. eradication of
   a. 1 and 4
   b. 2 and 3
   c. 1, 2, and 4
   d. 1, 2, and 3

   ANS: D
   Clinical microbiology addresses the identification, isolation, and control of pathogens, *not* their eradication.

   PTS: 1 REF: Page 25

5. A prokaryotic, unicellular organism that ranges in size from 0.5 to 50 µm is usually classified as which of the following?
   a. Virus
   b. Protozoan
   c. Bacterium
   d. Retrovirus

   ANS: C
   This is the definition of a bacterium.

   PTS: 1 REF: Page 25

6. When speaking about the morphology of bacteria, one is referring to its
   a. size.
   b. shape.
   c. function.
   d. movement.

   ANS: B
   There are three ways to classify bacteria: by its shape, by staining, and by its metabolic characteristics. Size, function, and movement are not characteristics used to classify bacteria.

   PTS: 1 REF: Page 25

7. Which of the following is a bacterium?
   a. Herpes simplex
   b. *Pneumocystis jiroveci*
   c. *Pseudomonas aeruginosa*
   d. *Candida albicans*

   ANS: C
   Herpes is a virus; *Pneumocystis carinii* is a protozoan; and *Candida albicans* is a fungus.

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8. A sputum specimen is received in the microbiology laboratory. Gram staining and a microscopic examination reveal a paired, spherical, purple-stained organism. It can be reasonably assumed that this organism is which of the following?
   a. Gram-negative bacilli
   b. Gram-negative staphylococci
   c. Gram-positive diplococci
   d. Gram-positive bacilli

   ANS: C
   Diplococci are spherically shaped bacteria that occur in pairs; Gram-positive organisms appear blue or violet. Gram-negative organisms have a red appearance from the counterstain. Staphylococci are cocci that occur in irregular clusters. Bacilli are rodlike organisms.

   PTS: 1 REF: Page 25

9. The word vibrio refers to
   a. the many shapes bacteria can assume.
   b. the erratic movement of bacteria.
   c. comma-shaped morphology.
   d. spirochete helical shape.

   ANS: C
   Vibrio refers to comma-shaped bacteria.

   PTS: 1 REF: Page 25, Fig. 2.1

10. An organism that appears blue or violet after staining is usually called
   a. Gram negative.
   b. Gram positive.
   c. Ziehl–Neelsen.
   d. acid fast.

   ANS: B
   Gram-positive organisms stain blue or violet, whereas Gram-negative organisms appear red from a counterstain of red dye safranin. Acid-fast stains (also called *Ziehl–Neelsen stains*) are different tests.

   PTS: 1 REF: Page 25

11. Which of the following is a Gram-negative pathogen?
   a. *Bacillus anthracis*
   b. *Staphylococcus aureus*
   c. *Pseudomonas aeruginosa*
   d. *Clostridium botulinum*

   ANS: C
   Bacillus anthracis, Staphylococcus aureus, and *Clostridium botulinum* are Gram-positive pathogens.

   PTS: 1 REF: Page 26

12. Which of the following is spread by direct contact?

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a. Measles
b. Hepatitis B
c. Staphylococcus
d. Histoplasmosis

ANS: C
Staphylococcus is spread by direct contact. Measles are spread by droplets; hepatitis B, by indirect contact; and histoplasmosis, by airborne dust.

PTS: 1 REF: Page 29, Table 2.3

13. The Ziehl–Neelsen stain is useful in identifying which family of microorganisms?
a. Streptococci
b. *Mycobacterium*
c. Staphylococci
d. *Pseudomonas*

ANS: B
The Ziehl–Neelsen stain is also called the acid-fast stain and is used to identify *Mycobacterium* species such as *Mycobacterium tuberculosis*. This stain is not used to identify streptococci, staphylococci, or *Pseudomonas*.

PTS: 1 REF: Page 26

14. Which of the following is typically associated with tuberculosis (TB)?
a. *Mycobacterium*
b. *Pseudomonas*
c. *Clostridium*
d. *Bordetella*

ANS: A
Mycobacterium tuberculosis is the organism responsible for pulmonary, spinal, and miliary TB.

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15. Bacteria that require oxygen for growth are typically known as
a. aerobes.
b. airborne.
c. anaerobes.
d. autotrophs.

ANS: A
Aerobes require oxygen for life. Airborne refers to the method of transmission of infectious diseases. Anaerobes can grow and live without oxygen, and autotrophs require simple inorganic nutrients to sustain themselves.

PTS: 1 REF: Page 26

16. Which of the following is true concerning facultative anaerobes?
a. They have limited oxygen tolerance.
b. They require complex nutrients to exist.

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c. They cannot live in oxygen environments.
d. They require simple inorganic nutrients to exist.

ANS: A
Facultative anaerobes have limited oxygen tolerance. Heterotrophs require complex nutrients to exist. Autotrophs require simple inorganic nutrients to exist. Only anaerobes cannot live in oxygen environments.

PTS: 1 REF: Page 26

17. To survive adverse conditions, such as excessive heat and dryness, bacteria might do which of the following?
a. Store excess water in special spore-like structures.
b. Form large colonies in a short period of time.
c. Speed up their enzymatic processes.
d. Form endospores.

ANS: D
Certain bacteria form endospores under adverse conditions such as dryness, heat, and poor nutrition. Bacteria do not undergo any of the other processes mentioned.

PTS: 1 REF: Page 26

18. Ventilator-associated pneumonia is commonly caused by which of the following?
a. *Escherichia coli*
b. *Bacillus anthracis*
c. *Enterobacteriaceae*
d. *Corynebacterium diphtheriae*

ANS: C
Ventilator-associated pneumonia is most commonly caused by *Pseudomonas aeruginosa, Staphylococcus aureus, Enterobacteriaceae, Haemophilus influenzae,* and *Streptococcus* spp.

PTS: 1 REF: Page 28, Box 2.1

19. A virus can be described as a parasite with which of the following traits?
a. Nucleic acid core
b. Carbohydrate sheath
c. Size of less than 20 nm
d. Ability to produce spores

ANS: A
Viruses have a nucleic acid core surrounded by a protein sheath; viruses range from 20 to 200 nm. They do not produce spores.

PTS: 1 REF: Page 26

20. Viruses are usually described as nonliving because they
a. do not have a cell wall.
b. are unable to self-replicate.
c. must create endospores to survive.
d. cannot live without another living organism.

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ANS: B
Viruses must invade a living organism to replicate. This is the reason that they are described as nonliving. They do have a wall-like structure that is made of protein. They do not create endospores and are able to live outside a host; however, they cannot replicate outside of a host.

PTS: 1 REF: Page 26

21. Which of the following is a virus that has a respiratory route of transmission?
    a. Polio virus
    b. Hepatitis
    c. Coronavirus
    d. Herpes simplex virus

ANS: C
Coronavirus has a respiratory route of transmission; for polio, the route of transmission is through the gut. Hepatitis is transmitted through body fluids and blood, and herpes simplex has several routes of transmission, including oral, genital, and ocular.

PTS: 1 REF: Page 27, Table 2.2

22. *Chlamydia* species are classified as
    a. viruses.
    b. bacteria.
    c. protozoa.
    d. intracellular parasites.

ANS: D
Chlamydia species have complex structures that resemble those of bacteria and they act like viruses in that they require a living host to replicate, but they are actually intracellular parasites. Protozoa are unicellular eukaryotes.

PTS: 1 REF: Page 26

23. Which of the following is the type of organism that causes malaria and trypanosomiasis?
    a. Virus
    b. Parasite
    c. Protozoa
    d. Bacteria

ANS: C
Protozoan infections include amebiasis, malaria, and trypanosomiasis.

PTS: 1 REF: Page 26

24. Which of the following is the organism that is associated with pneumonia in immune-compromised patients in the United States?
    a. *Schistosoma*
    b. *Shigella*
    c. *Pneumocystis*
    d. *Rickettsiae*

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ANS: C
Pneumocystis pneumonia is common in immunocompromised patients—particularly those infected with human immunodeficiency virus. *Pneumocystis* is a fungal infection. *Schistosoma* is a blood fluke. *Shigella* is a Gram-negative, non–spore-forming, rod-shaped bacteria. *Rickettsiae* are intracellular parasites that resemble bacteria.

PTS: 1 REF: Page 28

25. Airborne droplet nuclei are responsible for the transmission of
    a. legionellosis.
    b. histoplasmosis.
    c. staphylococcus.
    d. TB.

    ANS: D
    TB is transmitted by droplet nuclei. Legionellosis is transmitted by airborne aerosols; histoplasmosis, by airborne dust; and staphylococcus, by direct contact.

    PTS: 1 REF: Page 29, Table 2.3

26. A budding unicellular organism revealed in the microscopic examination of sputum is most likely
    a. yeast.
    b. *Bacillus.*
    c. *Rickettsia.*
    d. *Clostridium.*

    ANS: A
    Yeast reproduces by budding. Bacteria reproduce either by binary fission or conjugation. *Rickettsia* reproduces by binary fission.

    PTS: 1 REF: Page 28

27. Which of the following organisms can be transmitted via the respiratory tract?
    1. Hepatitis
    2. Influenza
    3. Varicella
    4. Parainfluenza
    a. 1 and 4
    b. 2, 3, and 4
    c. 1 and 2
    d. 2 and 3

    ANS: B
    Hepatitis is transmitted through blood and body fluids.

    PTS: 1 REF: Page 29, Table 2.3

28. Which of the following is the least likely mode of transmission for a nosocomial infection?
    a. Airborne
    b. Through fomites
    c. Vector-borne

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d. Direct contact

ANS: C
The transmission of infections by vectors is rarely associated with nosocomial infections. In the hospital, instruments and equipment (through fomites) are common sources of hospital-acquired infections. Direct contact is also a common way to transmit nosocomial infections.

PTS: 1 REF: Page 29

29. The spread of diseases requires which of the following?
1. A pathogen source
2. Immunosuppression
3. Mode of transmission
4. A susceptible host
a. 1 and 4
b. 1, 3, and 4
c. 2 and 3
d. 1, 2, and 4

ANS: B
Immunosuppression is not a requirement for the transmission of an infectious disease. However, a pathogen source, mode of transmission, and susceptible host must be present. A susceptible host does not have to be immunosuppressed to be considered susceptible. The host could have had surgery, be intubated, or have an indwelling catheter to be susceptible.

PTS: 1 REF: Page 28

30. You are visiting a country that has been plagued by heavy rains and flooding. The population is suffering from widespread disease. Which of the following is the most likely cause of the disease?
a. Cholera
b. Influenza
c. Legionella
d. Salmonellosis

ANS: A
Cholera is a waterborne infectious disease. With excessive rains and flooding, this waterborne bacterium might flourish. Legionella is spread by aerosols. Salmonellosis is a foodborne infectious disease. Influenza is spread through the respiratory tract.

PTS: 1 REF: Page 29, Table 2.3

31. The skin and mucosal tissue can prevent the spread of infectious agents by acting as _____ barriers.
a. immunologic
b. mechanical
c. epidermal
d. soft

ANS: B

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The skin and mucous membranes are mechanical barriers to infection, meaning that they physically prohibit the transfer of infectious organisms into a host.

PTS: 1 REF: Page 28

32. Which of the following is a common pathogen that could cause a disruption of normal flora in a patient receiving antibiotic therapy?
    a. *Clostridium difficile*
    b. *Pneumocystis carinii*
    c. *Enterobacteriaceae* spp.
    d. *Pseudomonas aeruginosa*

    ANS: A
    Clostridium difficile are the bacteria that cause the disruption of normal flora in the gastrointestinal tract caused by antibiotic therapy. *Pneumocystis carinii* are the protozoa that cause pneumonia in immunocompromised patients with human immunodeficiency virus. *Enterobacteriaceae* spp. are the bacteria that can cause hypogammaglobulinemia in patients with multiple myeloma.

    PTS: 1 REF: Page 30, Table 2.4

33. Transmission of an infectious agent by flies would fall into which mode of disease transfer?
    a. Vector-borne
    b. Airborne
    c. Contact
    d. Indirect

    ANS: A
    Insects are the transmission agents in vector-borne infectious diseases. Airborne, indirect, and contact transmission are not accomplished via insects.

    PTS: 1 REF: Page 29

34. Which of the following are the two primary human barriers to infection in the health care setting?
    a. Disinfection and sterilization
    b. Immunologic and mechanical
    c. Disinfection and pasteurization
    d. Hand-washing and personal protective equipment

    ANS: B
    Human barriers to infection include the mechanical barriers of the skin and mucous membranes and the person's immune system. The others are preventative measures that reduce the spread of infection in health care settings.

    PTS: 1 REF: Page 28

35. An agent that destroys pathogenic microorganisms on inanimate objects only is best described as a
    a. virucide.
    b. germicide.
    c. bactericide.

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d. disinfectant.

ANS: D
A disinfectant describes agents that destroy pathogenic microorganisms on inanimate objects only. Germicide is a general term used to describe agents that destroy pathogenic microorganisms on living tissue and inanimate objects. A bactericide destroys all pathogenic bacteria. A virucide destroys viruses only.

PTS: 1 REF: Pages 30-31

36. Sterilization differs from pasteurization in that sterilization destroys
a. bacteria and fungi only.
b. only bacteria.
c. all microbes.
d. only viruses.

ANS: C
Bactericides destroy only pathogenic bacteria. Fungicides kill fungi, and virucides kill viruses. Sterilization kills all microbes including spores, whereas pasteurization is a disinfection process that removes most pathogenic microorganisms *except* bacterial endospores.

PTS: 1 REF: Page 35

37. Which of the following are factors that affect disinfection and sterilization?
1. Shape of the pathogen
2. Number of organisms
3. Resistance of the pathogen
4. Strength of the germicide
a. 2, 3, and 4
b. 3 and 4
c. 1 and 3
d. 2 and 3

ANS: A
The shape of the organism does not make a difference in how disinfection and sterilization work. The number, location, and innate resistance of the microorganisms; the concentration and potency of the germicide; the duration of exposure; and the physical and chemical environment in which the germicide is used are all factors that affect disinfection and sterilization.

PTS: 1 REF: Page 35

38. Which of the following are true about the amount of time required to kill microbes?
1. Time decreases as the strength of the germicide decreases.
2. Time is directly proportional to the number of pathogens.
3. Time increases as the microbial population increases.
4. Time varies with the resistance of the organism.
a. 2, 3, and 4
b. 3 and 4
c. 1 and 3
d. 2 and 3

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ANS: A
The number of pathogens and their resistance affect the amount of time it takes to kill microbes. Increased strength of a germicide will decrease the amount of time to kill the microbes.

PTS: 1 REF: Page 29

39. Which of the following medical states increase patient susceptibility to nosocomial infection?
a. Hypoglycemia
b. Altered B cells
c. Hyperbilirubinemia
d. Hypogammaglobulinemia

ANS: D
Hypogammaglobulinemia is the only answer that describes a condition that increases susceptibility to nosocomial infections.

PTS: 1 REF: Page 30, Table 2.4

40. A patient's susceptibility to *Pseudomonas aeruginosa* is increased by
a. organ transplantation.
b. multiple myeloma.
c. antibiotic therapy.
d. chemotherapy.

ANS: D
Oncochemotherapy increases a patient's susceptibility to *Pseudomonas aeruginosa* and *Candida*. Organ transplantation increases a patient's susceptibility to toxoplasmosis. Multiple myeloma increases a patient's susceptibility to *Haemophilus influenzae*. Antibiotic therapy increases a patient's susceptibility to *Clostridium difficile*.

PTS: 1 REF: Page 30, Table 2.4

41. After a ventilator is cleaned and ready for use, it should be stored in
a. the hallway near the freight elevators.
b. the back of the preparation area.
c. the back of the clean-up area.
d. a separate "clean room".

ANS: D
A separate "clean room" is necessary so that dirty and clean equipment remain separate. Hallways, prep areas, and clean-up areas are not ideal places to store clean equipment.

PTS: 1 REF: Page 31

42. In general, germicides are most effective in which of the following environments?
a. Lower acidity
b. Lower alkalinity
c. Lower temperatures
d. Higher temperatures

ANS: D

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Higher temperatures increase the activity of most germicides. Higher alkalinity also improves the antimicrobial activity of some disinfectants. Lower temperatures and acidity do not improve the action of germicides.

PTS: 1 REF: Page 35

43. Under normal conditions, high-level disinfectants can kill which of the following organisms?
1. Fungal buds
2. Bacterial spores
3. Gram-positive bacteria
4. Gram-negative bacteria
a. 3 and 4
b. 1, 3, and 4
c. 1 and 2
d. 2 and 4

ANS: B
Bacterial spores are not killed by high-level disinfectants unless they are exposed to the disinfectant for an extended time. Fungi and all bacteria are killed by high-level disinfectants.

PTS: 1 REF: Page 31

44. Flash pasteurization exposes equipment to which of the following?
a. Water bath at 72°C for 15 minutes
b. Water bath at 63°C for 30 minutes
c. Moist heat at 72°C for 15 minutes
d. Moist heat at 72°C for 15 seconds

ANS: D
There are only two methods for pasteurization: the flash process and the batch process. The flash process requires moist heat at 72°C for 15 seconds, and the batch process requires a water bath at 63°C for 30 minutes.

PTS: 1 REF: Page 33

45. Quaternary ammonium salts are routinely used to sanitize
a. ventilator circuits.
b. nebulizers.
c. walls and furniture.
d. critical respiratory care equipment.

ANS: C
Quats are bactericidal, fungicidal, and virucidal toward lipophilic viruses. They are not sporicidal, tuberculocidal, or virucidal toward hydrophilic viruses. They are used to sanitize noncritical surfaces like walls and furniture. Most ventilator tubing is disposable and is therefore not cleaned and disinfected.

PTS: 1 REF: Page 33

46. Alcohols such as ethyl and isopropyl are unable to kill
a. fungi.

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b. viruses.
c. bacteria.
d. bacterial spore.

ANS: D
Ethyl and isopropyl alcohols are bactericides, fungicides, and virucides, but they do not kill bacterial spores.

PTS: 1 REF: Page 33

47. The ability of alcohols to act as an effective disinfectant decreases significantly when their concentration drops below
a. 30%.
b. 50%.
c. 70%.
d. 90%.

ANS: B
Below 50% concentration, the ability of alcohols to disinfect decreases significantly.

PTS: 1 REF: Page 33

48. The respiratory therapist is in a contact isolation room with a patient. The stethoscope for use with this patient is located within the patient's room. Which of the following is the most appropriate solution for disinfecting this stethoscope?
a. Acetic acid
b. Ethylene oxide
c. Glutaraldehyde
d. Isopropyl alcohol

ANS: D
Alcohols are used to disinfect equipment such as thermometers, stethoscopes, and fiberoptic endoscopes; in addition, they are used to clean the surfaces of mechanical ventilators and preparation areas. Acetic acid is the disinfectant of choice with home respiratory care equipment and is not often used in the hospital setting. Glutaraldehyde is a respiratory irritant and would not be appropriate for use in patient care areas. Ethylene oxide cannot be used at the bedside because it requires specialized equipment and takes several steps to prepare it for disinfectant use.

PTS: 1 REF: Page 33

49. Phenolic compounds are generally diluted to what concentration?
a. 0.04% to 0.05%
b. 0.4% to 5.0%
c. 40% to 50%
d. 4% to 5%

ANS: B
Phenolic compounds are diluted to a 0.4% to 5% solution to provide a low to intermediate level of disinfection.

PTS: 1 REF: Page 32, Table 2.5

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50. Bacterial spores can be inactivated by exposure to
    a. 10 hours of iodophors.
    b. 8 hours of glutaraldehyde.
    c. 30 minutes of isopropyl alcohol.
    d. 6 hours of quaternary ammonium compounds.

    ANS: B
    Glutaraldehyde is sporicidal and has an exposure time of 6 to 8 hours. Iodophors are bactericidal, tuberculocidal, fungicidal, and virucidal, but they are not effective against bacterial spores. Alcohols are bactericidal, fungicidal, and virucidal, but they do not kill bacterial spores. Quaternary ammonium compounds are not sporicidal.

    PTS: 1 REF: Page 34

51. A residue will remain on equipment exposed to
    a. formaldehyde.
    b. isopropyl alcohol.
    c. hydrogen peroxide.
    d. quaternary ammonium compounds.

    ANS: A
    Formaldehyde will leave a residue on equipment. The other agents listed in these choices will not.

    PTS: 1 REF: Page 32, Table 2.5

52. Which of the following is the most common physical method of disinfection?
    a. Quaternary ammonium compounds
    b. Alcohols
    c. Pasteurization
    d. Autoclaving

    ANS: C
    Formaldehyde is a respiratory irritant. The other agents listed are not.

    PTS: 1 REF: Page 32, Table 2.5

53. A typical high-level disinfectant can kill organisms—but *not* spores—in what time period?
    a. 24 hours
    b. 1 to 2 hours
    c. 12 to 18 hours
    d. Less than 45 minutes

    ANS: D
    High-level disinfectant agents are typically chemical sterilants that are used at reduced exposure times, usually less than 45 minutes. They kill bacteria, fungi, and viruses in this period of time. However, spores are not killed unless the chemical is used for an extended period of time.

    PTS: 1 REF: Page 34

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54. In batch pasteurization, equipment is placed in a water bath heated to ____ for 30 minutes.
    a. 63°C
    b. 72°C
    c. 163°C
    d. 175°C

    ANS: A
    Batch pasteurization requires the equipment to be exposed to a water bath at 63°C for 30 minutes. Flash pasteurization requires equipment to be exposed to moist heat at 72°C for 15 seconds.

    PTS: 1 REF: Page 33

55. Acid glutaraldehyde is tuberculocidal with a minimum exposure time of _____ minutes.
    a. 10
    b. 20
    c. 30
    d. 40

    ANS: B
    Acid glutaraldehyde is bactericidal, fungicidal, and virucidal with a 10-minute exposure time. However, exposure time must be extended to 20 minutes for it to become tuberculocidal.

    PTS: 1 REF: Page 34

56. The statement "A disinfectant's potency increases as its concentration increases" is true for which of the following?
    1. Phenols
    2. Alcohols
    3. Iodophors
    4. Glutaraldehydes
    a. 1 and 3
    b. 2 and 4
    c. 1, 2, and 4
    d. 1, 3, and 4

    ANS: C
    Iodophors are the only exception to this statement.

    PTS: 1 REF: Page 34

57. During a home care visit, the respiratory therapist is instructing the patient and family member on the use of the patient's equipment. Which of the following household items should the respiratory therapist inform the patient to use to decontaminate the equipment?
    a. Alcohol
    b. Vinegar
    c. Bleach
    d. Lye

    ANS: B

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White household vinegar is used extensively as a method for decontaminating home care respiratory equipment. One part 5% white household vinegar and three parts water should be used. Bleach and lye are too dangerous for the patient to use and are respiratory irritants. Prolonged and repeated use of alcohol can cause swelling and hardening of rubber and plastic tubes.

PTS: 1 REF: Page 33

58. An oxygen atom can be added to acetic acid to form an excellent disinfectant with sterilization capabilities. This disinfecting agent is
    a. peroxide.
    b. peroxidic acid.
    c. peracetic acid.
    d. acetic peroxide.

    ANS: C
    Peracetic acid is an excellent disinfectant with sterilization capabilities. It kills microbes by denaturing proteins, disrupting cell wall permeability, and oxidizing cellular metabolites. Its shortcoming is that it can corrode brass, iron, copper, and steel.

    PTS: 1 REF: Page 34

59. Carbolic acid is
    a. an acetic acid derivative.
    b. a common disinfectant.
    c. the basis for phenol derivatives.
    d. the only form of acid glutaraldehyde.

    ANS: C
    Carbolic acid is the prototype 6-carbon aromatic compound. It was first used as a germicide by Lister in his pioneering work on antiseptic surgery. It is no longer used.

    PTS: 1 REF: Page 33

60. The Centers for Disease Control and Prevention recommends that blood spills be cleaned with
    a. ethanol.
    b. peracetic acid.
    c. sodium hypochlorite.
    d. alkaline glutaraldehyde.

    ANS: C
    The Centers for Disease Control and Prevention recommends that a 1:10 dilution of sodium hypochlorite be used to clean blood spills.

    PTS: 1 REF: Page 34

61. A 1.25% solution of acetic acid has been shown to be an effective bactericidal agent against
    a. *Staphylococcus aureus.*
    b. *Pseudomonas aeruginosa.*
    c. *Mycobacterium tuberculosis.*
    d. *Streptococcus pneumoniae.*

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ANS: B
Pseudomonas aeruginosa is killed by 1.25% acetic acid or one part 5% white household vinegar and three parts water. *Pseudomonas aeruginosa* transmission is through indirect contact via fomites, such as those on clothing, surgical bandages, and especially equipment. It is the most common respiratory pathogen in patients with cystic fibrosis and is encountered in patients with chronic obstructive pulmonary disease (COPD).

PTS: 1 REF: Page 33

62. Which of the following indicates the minimum time a tracheostomy inner cannula should be soaked in 3% hydrogen peroxide to be an effective disinfectant during a patient's tracheostomy care?
a. 1 minute
b. 5 minutes
c. 10 minutes
d. 15 minutes

ANS: C
Commercially available 3% solutions of hydrogen peroxide are effective disinfectants of bacteria (including *Mycobacteria* sp.), fungi, and viruses and are active within 10 minutes at room temperature. To be effective against spores, the solution would need to be at 50°C and the equipment would need to be soaked for at least 20 minutes.

PTS: 1 REF: Page 35

63. The Centers for Disease Control and Prevention recommends a _____ dilution of bleach to water to clean up blood spills.
a. 1:1
b. 1:2
c. 1:10
d. 1:100

ANS: C
The Centers for Disease Control and Prevention recommends that a 1:10 dilution of sodium hypochlorite be used to clean up blood spills.

PTS: 1 REF: Page 35

64. Which type of germicide requires activation with bicarbonate?
a. 5% acetic acid
b. 2% alkaline glutaraldehyde
c. 3% hydrogen peroxide
d. 10% sodium hypochlorite

ANS: B
Only alkaline glutaraldehyde requires activation with a bicarbonate solution. This yields a solution with a pH of 7.5 to 8.5.

PTS: 1 REF: Page 35

65. Commercial-grade hydrogen peroxide is an effective disinfectant at room temperature after how many minutes?

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a. 5
b. 10
c. 30
d. 60

ANS: B
Commercially available 3% solutions of hydrogen peroxide are effective disinfectants of bacteria (including *Mycobacteria* sp.), fungi, and viruses and are active within 10 minutes at room temperature.

PTS: 1 REF: Page 35

66. Which of the following physical properties are required for an autoclave to sterilize biohazardous material?
1. Dry heat
2. A vacuum
3. 100% humidity
4. Increased air pressure
a. 2 and 3
b. 1 and 3
c. 1, 2, and 4
d. 2, 3, and 4

ANS: D
Air is evacuated, moisture is added (100% humidity), and the pressure inside the autoclave is raised to 15 to 20 lb-force per square inch gauge (psig). Air is evacuated from the chamber because residual air prolongs the penetration time of steam, thus increasing the total autoclave cycle time. Pressure is used to raise the temperature of the steam, which is critical because the amount of time required to achieve sterilization depends on the temperature inside of the autoclave. Dry heat is not used during autoclaving.

PTS: 1 REF: Page 35

67. Dry-heat sterilization involves a 1- to 2-hour exposure at approximately
a. 100°C.
b. 132°C.
c. 170°C.
d. 200°C.

ANS: C
Dry heat is another effective method of heat sterilization. Its use is limited to items that are not heat-sensitive. Temperatures must be maintained between 160°C and 180°C for 1 to 2 hours for sterilization.

PTS: 1 REF: Page 35

68. At high altitudes, sterilization by boiling must be prolonged primarily because of which of the following?
a. Increased oxygen content
b. Reduced oxygen content
c. Increased normal boiling point

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d. Reduced normal boiling point

ANS: D
Because water boils at a lower temperature at high altitudes, exposure time must be prolonged during this form of sterilization at high elevations.

PTS: 1 REF: Page 35

69. Which of the following should routinely be used to ensure proper function and quality control of an autoclave?
1. Pressure-sensitive tape
2. Biologic indicators
3. Chemical indicators
4. Heat-sensitive tape
a. 2 and 3
b. 2 and 4
c. 1, 2, and 3
d. 1, 2, and 4

ANS: B
Because the process of autoclaving depends on several factors, heat-sensitive tape and biologic indicators are routinely used to ensure quality control during the process. Heat-sensitive tape that is used for packaging materials for autoclaving changes color when it is exposed to a given temperature for a prescribed amount of time. The most common biologic indicators for autoclaving are strips of paper that are impregnated with *Bacillus stearothermophilus* spores. These strips should be used weekly (at a minimum) to ensure that the autoclave is working properly. Biologic indicators are also used for ethylene oxide sterilization.

PTS: 1 REF: Page 35

70. According to the classification of infection-risk devices described by Spaulding, ventilator tubing is considered
a. critical.
b. noncritical.
c. semicritical.
d. highly critical.

ANS: C
Ventilator tubing comes in contact with intact mucous membranes and is considered semicritical. Critical items are those that are introduced into sterile tissue or the vascular system. Noncritical items come in contact with intact skin. Noncritical items include face masks, ventilators, stethoscopes, and blood pressure cuffs. Highly critical is not a descriptor that Spaulding used.

PTS: 1 REF: Page 37

71. According to the classification described by Spaulding, which of the following items of medical equipment falls into the category of noncritical infection risk?
a. Scalpels
b. Ventilators

c. Ventilator tubing
d. Manual resuscitators

ANS: B
Noncritical items come in contact with intact skin. These items include face masks, ventilators, stethoscopes, and blood pressure cuffs. Scalpels are introduced into sterile tissue and are considered critical items. Ventilator tubing and manual resuscitators come in contact with intact mucous membranes and are considered semicritical.

PTS: 1 REF: Page 37

72. Which of these precautions must be followed in the treatment of a patient with an influenza infection?
1. Contact
2. Droplet
3. Airborne
4. Standard
a. 1 and 3
b. 2 and 4
c. 1, 2, and 4
d. 2, 3, and 4

ANS: B
Standard precautions need to be used for all patients. Droplet precautions are used for patients known or suspected to have serious illnesses transmitted by large-particle droplets. Influenza is a serious viral infection spread by droplet transmission. Contact isolation is used for patients known or suspected to have serious illnesses easily transmitted by direct patient contact or by contact with items in the patient's environment. Airborne precautions should be used for patients who are known or suspected to have illnesses transmitted by airborne droplet nuclei, such as measles, varicella, or TB.

PTS: 1 REF: Page 40, Box 2.6

73. Which of the following is the most important infection control procedure for anyone who has direct patient contact?
a. Sterile latex gloves
b. Disposal of sharps
c. Hand hygiene
d. Face masks

ANS: C
Handwashing is the most important prevention strategy to protect health care workers from being infected through contact with infected patients. It also reduces the risk of health care workers transmitting infectious microorganisms from one patient to another or from a contaminated site to a clean site on the same patient. Sterile gloves are worn during invasive procedures. Disposal of sharps is important when any sharps (e.g., needles) are used. Face masks need to be worn when there is a possibility of blood or body fluid being splashed or sprayed, such as during an arterial blood gas stick.

PTS: 1 REF: Pages 42-43

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74. Which of the following illnesses requires airborne precautions?
    a. Measles
    b. *Clostridium difficile*
    c. Herpes simplex virus
    d. *Mycoplasma pneumoniae*

    ANS: A
    Airborne precautions should be used for patients who are known to have or who are suspected of having illnesses transmitted by airborne droplet nuclei, such as measles, varicella, or TB. *Clostridium difficile* and the herpes simplex virus require contact isolation, because they are transmitted by direct patient contact or by contact with items in the patient's environment. *Mycoplasma pneumoniae* requires droplet precautions because it is spread by droplet transmission.

    PTS: 1 REF: Page 40, Box 2.6

75. Droplet isolation precautions call for all of the following, *except*
    a. face masks.
    b. latex gloves.
    c. protective eyewear.
    d. special air-handling.

    ANS: D
    Droplet precautions include masks, gloves, and protective eyewear but *not* special air-handling.

    PTS: 1 REF: Page 43

76. Which isolation precaution requires the patient to be placed in a private isolation room?
    a. Droplet
    b. Contact
    c. Airborne
    d. Universal

    ANS: C
    Airborne precautions have two major components: (1) placement of the infected patient in an area with appropriate air-handling and ventilation and (2) use of respiratory protective equipment by health care workers and visitors entering the patient's room. In cases in which an infected patient must be transported, the patient should wear a surgical mask to minimize dispersal of droplet nuclei. Current standards require that infected patients be placed in a private, negative-pressure isolation room. Negative air pressure within the room should be monitored relative to other areas of the hospital. Severe acute respiratory syndrome, measles, chicken pox (primary varicella zoster virus), and TB are illnesses that require airborne precautions.

    PTS: 1 REF: Page 42

77. In preparation for an arterial blood gas puncture on a noninfectious patient in the pulmonary laboratory, which of the following items of protective apparel should be used?
    1. Gown
    2. Gloves

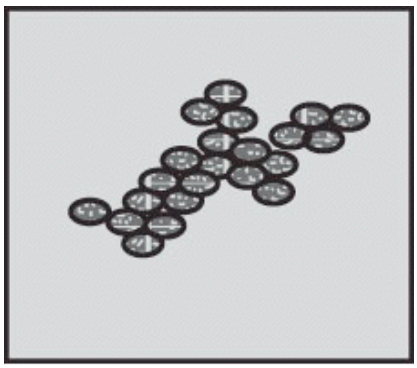
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3. Shoe covers
4. Eye protection
a. 1 and 2
b. 2 and 4
c. 2, 3, and 4
d. 1, 2, 3, and 4

ANS: B
The least amount of protective apparel that should be worn when drawing an arterial blood gas includes gloves and eye protection. In the case of a patient in isolation, a gown should be worn if there is a chance of splashing blood. Shoe covers are not necessary in areas outside of the operating rooms.

PTS: 1 REF: Page 42

78. The below figure represents which of the following bacteria?

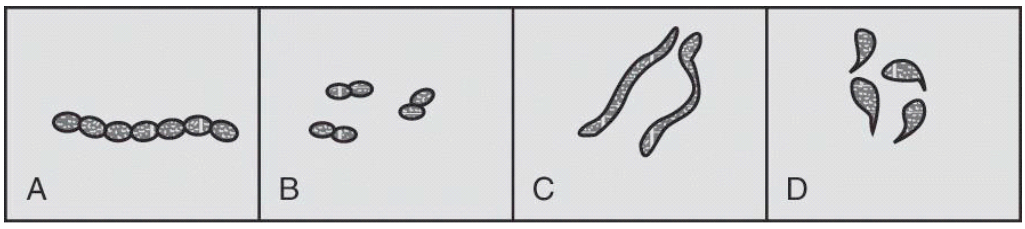


a. Bacillus
b. Diplococcus
c. Streptococcus
d. Staphylococcus

ANS: D
Cocci that occur in irregular clusters are called staphylococci. A bacillus is rod-shaped; a diplococcus is paired, sphere-shaped bacteria; and a streptococcus is a chain of cocci.

PTS: 1 REF: Page 25

79. Which of the following figure represents a spirochete?

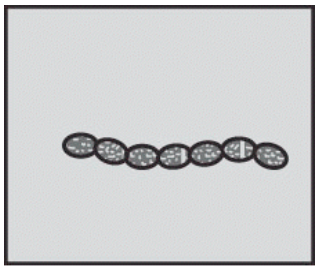


a. A
b. B
c. C
d. D

ANS: C
Bacteria that are spiral are called spirochetes. The others are designated as follows: (A) streptococci, (B) diplococci, and (D) vibrio.

PTS: 1 REF: Page 25

80. A Gram stain leaves the following organism violet. Which pathogen could this be?



a. *Escherichia coli*
b. *Bacillus anthracis*
c. *Staphylococcus aureus*
d. *Streptococcus pneumoniae*

ANS: D
Streptococcus pneumoniae are Gram-negative spheres that occur in chains. *Escherichia coli* are Gram-negative and rod-shaped. *Bacillus anthracis* are Gram-positive and rod-shaped. *Staphylococus aureus* are Gram-positive spheres that occur in irregular clusters.

PTS: 1 REF: Page 25

81. Which of the following is a commonly encountered Gram-negative, facultative anaerobic bacillus bacterium?
a. *Escherichia coli*
b. *Clostridium tetani*
c. *Neisseria meningitidis*
d. *Haemophilus parainfluenzae*

ANS: A
Escherichia coli are Gram-negative, rod-shaped facultative anaerobes. *Clostridium* are Gram-positive, rod-shaped anaerobes. *Neisseria meningitidis* are Gram-positive aerobes that occur in chains. *Haemophilus parainfluenzae* are Gram-negative, rod-shaped aerobes.

PTS: 1 REF: Page 26, Table 2.1

82. Which of the following viruses will cause bronchiolitis?
a. Influenza
b. Rhinovirus
c. Herpes zoster
d. Respiratory syncytial

ANS: D
Respiratory syncytial virus causes bronchiolitis. Influenza virus can cause tracheobronchitis and pneumonia. Rhinovirus causes rhinitis and pharyngitis. Herpes zoster causes vesicles on ectodermal tissues.

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PTS: 1 REF: Page 27, Table 2.2

83. What is the route of transmission for hepatitis?
    a. Gut
    b. Genitalia
    c. Body fluids
    d. Respiratory tract

    ANS: C
    The transmission route for hepatitis is blood and body fluids. The transmission route for coxsackievirus and polio is the gut. Herpes simplex can be transmitted through the genitals. The respiratory tract is the transmission route for influenza, mumps, measles, parainfluenza, respiratory syncytial virus, adenoviruses, rhinoviruses, varicella, and rubella.

    PTS: 1 REF: Page 27, Table 2.2

84. The definition "an aerobic, Gram-negative, rodlike bacteria" describes
    a. *Bacillus anthracis.*
    b. *Bordetella pertussis*.
    c. *Clostridium botulinum.*
    d. *Mycobacterium tuberculosis*.

    ANS: B
    Bordetella pertussis is Gram-negative, aerobic, and rod-shaped. *Bacillus anthracis* is Gram-positive, aerobic, and rod-shaped. *Clostridium botulinum* is Gram-positive, anaerobic, and rodlike. *Mycobacterium tuberculosis* is Gram-positive, aerobic, and rodlike.

    PTS: 1 REF: Page 27, Table 2.2

85. Legionellosis is transmitted by which of the following mode?
    a. Mosquitoes
    b. Airborne dust
    c. Airborne aerosol
    d. Waterborne vehicle

    ANS: C
    The transmission mode for legionellosis is through airborne aerosols. Mosquitoes transmit malaria. Airborne dust transmits histoplasmosis. Water transmits shigellosis and cholera.

    PTS: 1 REF: Page 27

86. Hepatitis B is spread by which type of transmission?
    a. Droplet nuclei
    b. Direct contact
    c. Indirect contact
    d. Foodborne vehicle

    ANS: C
    Hepatitis B is spread by indirect contact. TB and diphtheria are spread by droplet nuclei. Hepatitis A, venereal disease, human immunodeficiency virus, staphylococcus, and enteric bacteria are spread by direct contact. Salmonellosis and hepatitis A are spread through food.

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PTS: 1 REF: Page 29, Table 2.3

87. Opportunistic fungal infections are typically caused by which of the following?
    a. *Pneumocystis carinii*
    b. *Aspergillus fumigatus*
    c. *Histoplasma capsulatum*
    d. *Haemophilus haemolyticus*

    ANS: B
    Aspergillus fumigatus causes opportunistic fungal infections. *Pneumocystis carinii* is an opportunistic protozoan that causes pneumonia in immunocompromised patients. *Histoplasma capsulatum* can cause fungal infections in otherwise healthy individuals. *Haemophilus haemolyticus* is usually nonpathogenic, but on rare occasions it can cause subacute endocarditis.

    PTS: 1 REF: Page 28

88. Human immunodeficiency virus is transmitted by which of the following routes?
    a. Direct contact
    b. Droplet contact
    c. Indirect contact
    d. Airborne aerosol

    ANS: A
    Human immunodeficiency virus is transmitted by direct contact. TB and diphtheria are spread by droplet nuclei. Hepatitis B is spread by indirect contact. Legionellosis is spread by airborne aerosols.

    PTS: 1 REF: Page 29, Table 2.3

89. Safe needle practice calls for which of the following?
    a. Needles should not be recapped.
    b. Recap the needle with two hands.
    c. Sterile glove are necessary when drawing blood.
    d. Dispose of the needle in a hazardous waste bag.

    ANS: A
    Needles should not be recapped. When it is necessary to recap a syringe, both hands should never be used; instead, use the one-hand "scoop" technique or a mechanical device to recap syringe needles safely. Gloves should always be worn when using a needle to draw blood. Needles must be disposed of in a biohazard sharps (i.e., hard plastic) container.

    PTS: 1 REF: Page 42

90. Endotracheal intubation increases a patient's susceptibility to which of the following common pathogens?
    a. *Pneumocystis carinii*
    b. *Neisseria meningitidis*
    c. *Staphylococcus aureus*
    d. *Streptococcus pneumoniae*

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ANS: C
Endotracheal intubation increases a patient's susceptibility to *Staphylococcus aureus,* as well as *Pseudomonas aeruginosa, Enterobacteriaceae* species, and *Candida*. *Pneumocystis carinii* is common in patients with acquired immunodeficiency syndrome. Patients with systemic lupus erythematosus, liver failure, or vasculitis are susceptible to *Neisseria meningitidis* and *Streptococcus pneumoniae*.

PTS: 1 REF: Page 30, Table 2.4

91. Patients undergoing corticosteroid therapy have an increased risk of nosocomial infection from which of the following common pathogens?
a. *Candida albicans*
b. *Enterobacteriaceae* sp.
c. *Streptococcus pneumoniae*
d. *Staphylococcus epidermidis*

ANS: A
Corticosteroid therapy disrupts the normal flora of the oral cavity, leaving the patient at risk for the development of *Candida albicans*, which is otherwise known as thrush.

PTS: 1 REF: Page 30, Table 2.4

92. An adult is brought to the emergency department with third-degree burns over 40% of his body. This patient now has an increased susceptibility to which of the following organisms?
a. *Streptococcus pneumoniae*
b. *Pseudomonas aeruginosa*
c. *Candida albicans*
d. *Clostridium difficile*

ANS: B
The skin and mucosal barrier have been disrupted by the burns; therefore, this patient is susceptible to *Pseudomonas aeruginosa*. *Pseudomonas aeruginosa* is one of several pathogens that can affect hospitalized patients. Patients with systemic lupus erythematosus, liver failure, or vasculitis are susceptible to *Streptococcus pneumoniae*. Oncochemotherapy and antibiotic therapy increase a patient's susceptibility to *Candida albicans* and *Clostridium difficile*.

PTS: 1 REF: Page 30, Table 2.4

93. A 65-year-old male is intubated and placed on a mechanical ventilator after a motor vehicle accident. Thirty-six hours later he develops infiltrates on the chest radiograph. Which of the following actions may have been able to prevent this from occurring?
1. Elevation of the head of the bed 20 to 30 degrees
2. Changing ventilator circuit every 24 hours
3. Stress ulcer prophylaxis
4. Avoid the use of sedatives.
a. 1 and 2
b. 1, 2, and 3
c. 1, 3, and 4
d. 3 and 4

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ANS: C
The information indicates that the patient has ventilator-associated pneumonia; ventilator-associated pneumonia must be suspected anytime intubation develops shortly after endotracheal intubation. There are many actions that can be taken to prevent its development. Current standards state that the ventilator circuit should be changed only when it is grossly contaminated.

PTS: 1 REF: Page 38

94. A home care patient with COPD is being instructed on the use of a hand-held nebulizer. Which of the following would be the recommended method of disinfection for the nebulizer?
a. Alkaline glutaraldehyde
b. One part household vinegar and three parts water
c. Pasteurization
d. Autoclave

ANS: B
Acetic acid is the agent of choice to disinfect home care equipment due to its low cost and effectiveness. Alkaline glutaraldehyde requires a use of a hood for protection from fumes. Pasteurization and autoclave both require specialized equipment.

PTS: 1 REF: Page 38, Box 2.4

95. Which of the following conditions require the use of National Institute for Occupational Safety and Health (NIOSH)-approved respiratory protective devices?
1. *Pneumocystis jiroveci*
2. TB
3. Influenza
4. Smallpox
a. 1 only
b. 1 and 3
c. 1, 2, and 4
d. 2, 3, and 4

ANS: D
These conditions, TB, Influenza, and smallpox are all associated with droplet nuclei and require the use of an N-95 respirator.

PTS: 1 REF: Page 40

96. Intermediate-level disinfection methods kill which of the following organisms?
1. Fungi
2. Tubercle bacteria
3. Spores
4. Viruses
a. 1, 2, and 4
b. 2 and 3
c. 1, 3, and 4
d. 2 and 4

ANS: A

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Intermediate-level disinfectants kill most vegetative bacteria, some fungi, and some viruses.

PTS: 1 REF: Page 31

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