SECTION 5: Compounding and Dispensing Competencies
Chapter 35

Compounded Sterile Preparations and Laminar Airflow Hoods

A study guide has not been provided for this chapter. Many excellent resources are already available if a review of this topic is needed. Some of these resources are listed at the end of this chapter.

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<td>Demonstrates knowledge of the workflow in the sterile compounding area and complies with restrictions required in the anteroom and clean areas.</td>
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<td>Removes supplies from cartons and decontaminates with an approved disinfecting agent (e.g., 70% isopropyl alcohol) prior to transfer to the clean area. Does not bring objects that shed particles (e.g., cardboard cartons) into clean area. Does not bring food, beverages, or chewing gum into the clean and anteroom areas.</td>
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<td>Demonstrates proper infection control (removes jewelry; ties long hair back; washes to elbows with bacteriocidal soap).</td>
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<td>Dons appropriate apparel (e.g., gown, gloves, mask, hair and shoe covers) in the appropriate order prior to entering clean area. Sanitizes gloves with approved disinfectant (e.g., 70% isopropyl alcohol). Removes gown and discards hair cover, mask, shoe covers, and gloves when leaving the clean area.</td>
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<td>Demonstrates understanding that the most important part of a laminar airflow hood (LAH) is the HEPA filter.</td>
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<td>Demonstrates understanding that LAHs should be serviced and certified by a qualified technician every 6 months and when they are moved, repaired, or if the HEPA filter is contaminated by a spill.</td>
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<td>Demonstrates understanding that the prefilter should be cleaned or changed at least every month or as recommended by the manufacturer.</td>
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<td>Demonstrates understanding that a LAH must run for at least 30 minutes before it can be used.</td>
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<td>Demonstrates understanding that if the exhaust fan on a LAH is turned off, the hood must be cleaned before reuse.</td>
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<td>Demonstrates proper hood cleaning (uses sterile water followed by 70% isopropyl alcohol or other approved cleaning agent; cleans back to front; documents cleaning; cleans spills quickly).</td>
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<td>Cleans hood and sanitizes gloves with adequate frequency using approved disinfectant (e.g., 70% isopropyl alcohol).</td>
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<td>Demonstrates understanding that cytotoxic and other hazardous medications must not be prepared in a LAH utilized for compounding of other sterile preparations.</td>
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<td>Correctly performs all calculations prior to admixture preparation.</td>
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<td>Demonstrates understanding of volume of IV solution needed for medications such as vancomycin and erythromycin.</td>
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<td>Correct medications, solutions, and supplies decontaminated with approved disinfectant (or outer wrap removed) are placed in hood appropriately (i.e., at least 6 inches from the sides and front of the hood) to prevent blocking air flow. Keeps nonessential items outside hood.</td>
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<td>Checks labels both prior to and after compounding to ensure medications and solutions used agree.</td>
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<td>Demonstrates understanding of air flow in hood, maintains flow of clean air over objects in hood, does not interrupt air flow, works well within hood (6 inches).</td>
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<td>Places only hands and arms in hood. Does not take hands out of hood or leave the hood during admixture preparation.</td>
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<td>Demonstrates proper technique in swabbing with 70% isopropyl alcohol, entering, and withdrawing fluid from vials, ampules, and bags. Does not touch or contaminate components that must remain sterile.</td>
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<td>Minimizes positive pressure in vials during reconstitution or withdrawal of medication. Does not aspirate at any time.</td>
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<td>Demonstrates correct use of appropriate transfer devices (filter needles, vented needles, dispensing pins, and multi-add syringes, etc.).</td>
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<td>Demonstrates knowledge of the use of multiple-dose vials after initial entry (e.g., storage, beyond-use date).</td>
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<td>Demonstrates knowledge of the use of single-dose vials (does not retain as a multiple-dose vial).</td>
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<td>Demonstrates knowledge of the use of ampules (does not retain after use).</td>
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<td>Demonstrates knowledge of the use of pharmacy bulk vials after initial entry (e.g., storage, beyond-use date).</td>
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<td>Uses correct amounts of solutions and additives in compounding. Verifies amount of each additive prior to injecting into container. Ensures that contents of containers are thoroughly mixed.</td>
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<td>Inspects final admixture for incompatibilities, cores, particulate matter, and other defects.</td>
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<td>Uses proper techniques when assembling closed-system transfer devices (e.g., Add-Vantage, Mini-Bag Plus), mixing components of dual compartment containers, and using other special preparation systems.</td>
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<td>Demonstrates proper labeling, initialing, etc. of compounded sterile preparation containers (e.g., bags, syringes, bottles).</td>
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<td>Demonstrates knowledge of appropriate compounding risk levels, beyond-use dates, storage requirements, and base solutions for compounded sterile preparations (CSPs), or can show where to obtain data.</td>
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<td>Successfully completes aseptic technique validation testing (e.g., media-fill test).</td>
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<td>Performs quality assurance activities, as appropriate (e.g., sterility testing of compounded products, environmental monitoring, equipment cleaning, calibration, and maintenance). Documents all quality assurance activities on appropriate records (e.g., hood cleaning log, batch compounding records, environmental monitoring records).</td>
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<td>Monitors medications and supplies in the sterile compounding area. Reorders low supply items, checks refrigerator for recycled CSPs, checks freezer for stocked items to defrost, etc.</td>
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**Competence certified by:** ___________________________  **Date:** _______________
Compounded Sterile Preparations and Laminar Airflow Hoods

1. All of the following are advantages of parenteral versus oral administration except
   a. provides a more rapid onset of action
   b. ability to give medications to a patient who is unconscious
   c. medications must be sterile
   d. ability to give medications not absorbed well by the digestive tract
   e. ability to give medication to a patient with severe nausea and vomiting

2. A solution free of micro-organisms is considered
   a. acidic
   b. sterile
   c. isotonic
   d. alkaline
   e. none of the above

3. Subcutaneous injections involve
   a. a more rapid onset of action than with the intravenous route
   b. medications that are irritating to tissues
   c. medications that are insoluble
   d. a small volume of fluid
   e. none of the above

4. Intramuscular injections
   a. are usually given in muscles of the buttocks or upper arm
   b. may cause pain if a nerve is damaged by the needle
   c. can be used to administer injectable suspensions
   d. a and b
   e. a, b, and c

5. When a medication is given by intravenous (IV) administration
   a. the onset of action is slow
   b. the medication remains at the sight of injection
   c. the medication must be diluted in a small volume of fluid
   d. the medication bypasses barriers to absorption
   e. none of the above
6. Administration of a large volume of solution at a slow constant rate is called
   a. an intermittent infusion
   b. IV push
   c. a continuous infusion
   d. an IV injection
   e. none of the above

7. Leakage of an infused medication or solution from the vein into the surrounding tissue is called
   a. thrombophlebitis
   b. extravasation
   c. a pyrogenic reaction
   d. an allergic reaction
   e. none of the above

8. All of the following factors may decrease the flow of a solution through an administration set and into a vein except
   a. clogged filters
   b. thick solutions
   c. increased pressure in the vein
   d. small catheters
   e. large tubing

9. Piggyback administration of medications
   a. is accomplished through a “Y” site on the main administration set
   b. avoids prolonged mixing of medications in the same admixture
   c. requires only one venipuncture
   d. all of the above
   e. none of the above

10. Harmful particulate matter can be removed from an IV solution before it reaches the patient by using
    a. a final filter
    b. a heparin lock
    c. an IV catheter
    d. a volume control chamber
    e. none of the above

11. All of the following are parts of a needle except
    a. plunger
    b. shaft
    c. hub
    d. lumen
    e. bevel
12. How far from the outside edge should work be performed in a laminar airflow hood?
   a. 2 inches  
   b. 6 inches  
   c. 12 inches  
   d. 15 inches  
   e. none of the above

13. After turning on a laminar airflow hood, it cannot be used until it has run for at least
   a. 5 minutes  
   b. 15 minutes  
   c. 30 minutes  
   d. 1 hour  
   e. 2 hours

14. Which of the following methods of IV administration does not need an IV set?
   a. IV push  
   b. IV drip  
   c. IV piggyback  
   d. continuous infusion  
   e. intermittent infusion

15. Isotonic IV solutions
   a. cause a stinging sensation when administered  
   b. damage red blood cells  
   c. contain a concentration of dissolved substances lower than that of the red blood cells  
   d. contain a concentration of dissolved substances higher than that of the red blood cells  
   e. none of the above

16. Laminar airflow hoods should be cleaned
   a. weekly  
   b. each shift  
   c. when spills occur  
   d. a and c  
   e. b and c

17. When two medications combined in an IV solution produce a change in the color of the solution, a ______ has occurred.
   a. chemical incompatibility  
   b. physical incompatibility  
   c. therapeutic incompatibility  
   d. a or b  
   e. all of the above
18. The compatibility of IV admixture medications is affected by
   a. temperature
   b. order of mixing
   c. degree of dilution
   d. time
   e. all of the above

19. Prior to use, the laminar airflow hood must be cleaned with
   a. sterile water
   b. sterile water followed by 70% isopropyl alcohol
   c. 95% isopropyl alcohol
   d. soap and water
   e. none of the above

20. Which of the following is not a parenteral route of administration?
   a. subcutaneous
   b. intramuscular
   c. intra-arterial
   d. sublingual
   e. none of the above

21. A medication added to an IV solution is called a(n)
   a. core
   b. particulate
   c. preservative
   d. additive
   e. none of the above

22. To allow for proper airflow in a horizontal airflow hood, items are placed
   a. against the high-efficiency particulate air (HEPA) filter
   b. against the sides of the hood
   c. away from the sides and the HEPA filter
   d. directly in front of each other
   e. none of the above

23. Surfaces that must be cleaned inside the laminar airflow hood prior to use are
   a. the sides
   b. the work surface
   c. the HEPA filter
   d. the IV pole
   e. a, b, and d
24. Which of the following gauge sizes represents the largest needle bore size?
   a. 21
   b. 16
   c. 18
   d. 25
   e. Gauge refers to the length of the needle; the bore size is the same for all of the above.

25. The most important part of a laminar airflow hood is
   a. the prefilter
   b. the work surface
   c. the HEPA filter
   d. glass shield
   e. none of the above

26. The laminar airflow hood should be serviced and certified
   a. every month
   b. every 6 months
   c. every 12 months
   d. every other year
   e. none of the above

27. The sterile parts of a syringe that should never be touched are
   a. the barrel and plunger
   b. the barrel and tip
   c. the plunger and tip
   d. the barrel, plunger, and tip
   e. none of the above

28. The most frequent cause of contamination of IV admixtures is
   a. improperly functioning HEPA filter
   b. touch contamination
   c. improperly sterilized equipment
   d. dirty work surface in the hood
   e. none of the above

29. The work surface of the laminar airflow hood should be cleaned
   a. from back to front
   b. from front to back
   c. using a circular motion
   d. in three divided sections
   e. none of the above
30. A filter must be used when preparing an admixture from a medication that comes in an ampule because
   a. medications that come in ampules are not sterile
   b. once the ampule is opened, it is no longer considered sterile
   c. glass chips may fall into the solution when the ampule is broken
   d. medications stored for long periods of time in glass ampules may contain impurities
   e. none of the above

31. After compounding, all IV admixtures should be inspected
   a. for cracks, punctures, haziness, cores, and particulates
   b. to verify that the proper amount of the correct medication has been added to the correct solution
   c. to verify that the label is correct
   d. all of the above
   e. none of the above

32. To prevent a vacuum from being created in a vial when removing fluid into a syringe
   a. shake the vial
   b. swab the top with 70% isopropyl alcohol
   c. inject a quantity of air equal to the volume of fluid to be removed
   d. select the syringe size closest to the volume to be removed
   e. none of the above

33. To minimize coring when penetrating a rubber closure on a vial
   a. the bevel of the needle point should face downward prior to piercing the closure
   b. the bevel of the needle point should face upward prior to piercing the closure
   c. the vial should be held upside down
   d. air should be removed from the syringe
   e. none of the above

34. The prefilter in a laminar airflow hood should be cleaned or changed
   a. daily
   b. weekly
   c. monthly
   d. quarterly
   e. every 6 months
35. Beyond-use dates for compounded sterile preparations should be based upon
   a. stability information
   b. USP recommendations
   c. manufacturers' recommendations
   d. a and c
   e. a, b, and c

36. In the absence of sterility testing, medium-risk compounded sterile preparations may
    be stored at room temperature for a maximum of
   a. 24 hours
   b. 30 hours
   c. 48 hours
   d. 3 days
   e. 7 days
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Answer Key

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Suggested Reading and Resources


