

RSPT 1200
COURSE OBJECTIVES

I. MODULE A - MEDICATION ORDERS

A. The student will be able to:

1. List three sources of drugs.
2. List the components of a proper medication order.
3. Define the following frequency of medication delivery:
 - a. BID
 - b. TID
 - c. h.s.
 - d. PRN
 - e. STAT
4. Define the following commonly used abbreviations:
 - a. NS
 - b. D/C
 - c. a.c.
 - d. p.c.
 - e. mL
 - f. cc
 - g. qtt
 - h. qs
 - i. P.O.
 - j. MDI
 - k. Rx
 - l. IM
 - m. IPPB
 - n. SVN
 - o. SPAG
 - p. PF
 - q. PEFR
 - r. IV
 - s. DPI
 - t. Tx
 - u. NPO
 - v. OTC
 - w. FDA
 - x. PDR
 - y. BS
5. List the routes of medication delivery.
6. Define "parental administration" and list three types of parental administration.
7. List the four routes of medication delivery via inhalation.
8. List three types of nebulizers used to deliver respiratory medication.
9. Given a route of administration, explain the safety requirements associated with drug administration.
10. Explain two ways to confirm proper patient identification prior to giving a medication.
11. State the change in pulse rate needed to terminate a respiratory treatment.
12. Describe how the effectiveness of bronchodilators can be objectively measured?

13. List the items that should be documented in the patients chart following each treatment.
14. Describe the procedure you would follow in the event of an adverse reaction.
15. Define the following items found on a package insert for a drug:
 - a. Generic name
 - b. Trade name(s)
 - c. Indications
 - d. Contraindications
 - e. Modes of action
 - f. Adverse reactions
 - g. Routes of administration
 - h. Dosages
 - i. Hazards
 - j. Adverse reactions
16. Define the following terms:
 - a. FDA
 - b. Absorption
 - c. Distribution
 - d. Metabolism
 - e. Elimination
 - f. Selectivity
 - g. Racemic
 - h. Agonist
 - i. Antagonist
 - j. Drug affinity
 - k. Drug potency
 - l. Drug efficacy
 - m. Tolerance
 - n. Desensitization
 - o. Tachyphylaxis
 - p. Placebo
 - q. Additive
 - r. Synergism
 - s. Potentiation
 - t. Half life
 - u. Loading Dose
 - v. Maintenance Dose
 - w. Side effect
 - x. Cumulation
 - y. Emetic
 - z. Teratogenicity
 - aa. Systemic Effect
 - bb. Local Effect
 - cc. Therapeutic index
 - dd. LD₅₀
 - ee. ED₅₀
 - ff. Nosocomial infection
17. Describe how most drugs are metabolized and excreted.

II. MODULE B - DRUG DOSAGE CALCULATIONS AND NERVOUS SYSTEM

A. The student will be able to:

1. Given a prefix, state the related power of 10.
2. Define solute, solvent, and solution.
3. Convert between ratio solutions and percent solutions.
4. Given a medication of a known concentration and a physician's order for a different concentration, calculate how much additional volume needs to be added to fulfill the order.
5. Given two of the following three parameters, solve for the third:
 - a. Percent of Solution
 - b. Mass of drug (in grams or milligrams)
 - c. Volume of drug (in mL or L)
6. Calculate the body surface area, given a height, weight, and the Dubois Nomogram.
7. List the two divisions of the Nervous System.
8. State the number of spinal and cranial nerves.
9. Name and describe the 9th and 10th cranial nerve.
10. Describe the function of each of the following parts of a neuron:
 - a. Dendrite
 - b. Cell body
 - c. Axon
 - d. Synapse
11. Describe the function of the neurotransmitters.
12. List the two divisions of the autonomic nervous system.
13. Differentiate between the sympathetic and parasympathetic nervous systems.
14. Describe where the ganglia lie in each of the divisions of the autonomic nervous system.
15. Diagram the spinal column, showing the preganglionic, ganglia and postganglionic fibers of both systems.
16. State the neurotransmitters released at each of the following areas:
 - a. Preganglionic - sympathetic nervous system
 - b. Preganglionic - parasympathetic nervous system
 - c. Postganglionic - sympathetic nervous system
 - d. Postganglionic - parasympathetic nervous system
17. List the enzymes responsible for inactivating each of the neurotransmitters
18. Describe the effects of sympathetic nervous system stimulation
19. Describe the effects of parasympathetic nervous system stimulation
20. List the adrenergic receptor sites and explain where they are located.
21. Describe the effects of β_1 , β_2 and α stimulation.
22. List the cholinergic receptor sites and explain where they are located.
23. List two names given to the group of drugs that mimic acetylcholine.
24. List four names given to the group of drugs that mimic epinephrine and norepinephrine.
25. Define chronotropic and inotropic.
26. Define the following terms:
 - a. Sympathetic
 - b. Parasympathetic
 - c. Adrenergic
 - d. Cholinergic
 - e. Sympathomimetic

- f. Parasympathomimetic
- g. Sympatholytic
- h. Parasympatholytic
- i. Nicotinic
- j. Muscarinic
- k. Somatic

III. MODULE C - ADMINISTRATION AND MONITORING OF AEROSOL DELIVERY DEVICES

A. The student will be able to:

1. Define aerosol.
2. List three goals of aerosol therapy.
3. List three advantages and three disadvantages of using the aerosol route for delivery of medication.
4. Define each of the following and state how they influence delivery of an aerosol:
 - a. Stability
 - b. Penetration
 - c. Deposition
 - d. Inertial Impaction
5. State the proper particle size for optimal aerosol delivery.
6. Define MMAD.
7. List four factors that influence deposition of aerosol in the respiratory tract.
8. State the percentage deposition of aerosolized medication in the lungs.
9. Describe what happens to the remainder of the drug that is inhaled but not deposited in the pulmonary system.
10. Describe the optimal breathing pattern for aerosol delivery.
11. List six types of aerosolized medications.
12. List six considerations that determine which aerosol delivery device should be used.
13. For each of the following aerosol administration devices, describe the device used, the proper patient instructions for administration, and the care of the device required:
 - a. Metered Dose Inhaler (MDI)
 - b. Dry Powder Inhaler (DPI)
 - c. Small Volume Nebulizer (SVN)
 - d. Ultrasonic Nebulizer (USN)
 - e. Small Particle Aerosol Generator (SPAG)
 - f. Continuous Nebulization
14. Given a Maxair[®] inhaler, properly instruct the patient on use.
15. Given a prescription, explain how to calculate how long a MDI will last.
16. Differentiate between a spacer and a holding chamber.
17. Explain the purpose of the spacer or holding chamber.
18. Describe why a spacer may "whistle".
19. Describe how to instruct a patient in use of an MDI with a spacer or holding chamber.
20. Describe how to clean a MDI.
21. Describe how to clean a holding chamber.
22. Given one of the following DPI, describe how to instruct a patient on its use:
 - a. Diskus
 - b. Turbuhaler
 - c. Handihaler
 - d. Twisthaler
23. Describe how to decrease incidence of fungal infections with steroid metered dose inhalers.
24. Differentiate between an atomizer and a nebulizer.
25. State whose principle nebulizers utilize to create an aerosol.
26. Differentiate between conventional nebulizers and those that are breath-activated nebulizers (BAN).

27. Describe the difference between a conventional small-volume nebulizer and each of the following:
 - a. AeroEclipse
 - b. Circulaire
 - c. Respirgard II
28. State the effect of altering the amplitude or frequency on aerosol generation with a ultrasonic nebulizer.
29. List the indication for continuous nebulization of bronchodilators.
30. Given an appropriate prescription, calculate how much medication and diluent would be needed for continuous nebulization.
31. Describe how the effectiveness of a bronchodilator is determined at the bedside.
32. Describe how you would instruct a patient to perform a peak expiratory flow rate.
33. Describe how to instruct an asthmatic patient to determine their personal best effort and how to monitor their peak expiratory flow rate using the traffic light system.
34. Given a peak flow, determine if the patient has mild, moderate or severe airway obstruction.
35. Given the formula, calculate the peak flow for a male and female.
36. Calculate the % change from pre- to post-bronchodilator therapy given a peak expiratory flow rate or FEV₁.
37. Properly assess the patient to determine the appropriateness of a given aerosol delivery device.
38. Explain how a metered dose inhaler or small volume nebulizers should be properly cleaned in the home care setting.

IV. MODULE D - MECHANISM OF BRONCHODILATION/BRONCHOCONSTRICTION

A. The student will be able to:

1. Differentiate between bronchospasm and bronchoconstriction.
2. List the three categories of sympathomimetics and explain the chemical structure of each.
3. List the bronchodilators classified in each category of sympathomimetics.
4. Given a drug, state the generic and trade name.
5. Define β_2 (Beta-2) agonist.
6. Describe the intracellular mechanism of bronchodilation.
7. Describe the intracellular mechanism of bronchoconstriction.
8. Define the following terms:
 - a. Front Door bronchodilators
 - b. Side Door bronchodilators
 - c. Back Door bronchodilators
9. Describe how sympathomimetics cause bronchodilation at the cellular level.
10. Describe how methylxanthines cause bronchodilation at the cellular level.
11. Describe how anticholinergics cause bronchodilation at the cellular level.
12. List the 3 major methylxanthines.
13. State the therapeutic blood level of methylxanthines.
14. State two non-pulmonary conditions where methylxanthines are used.
15. Describe the difference between theophylline and aminophylline.
16. List two clinical conditions in which racemic epinephrine would be indicated.
17. Calculate drug dosages for the following:
 - a. Percent (%) solutions
 - b. Ratio solutions
 - c. Dilutions problems
 - d. Pediatric dosages
18. List which sympathomimetics are most commonly used for continuous nebulization.
19. Give an example of synergism.
20. State the advice to provide patients with on the proper use of salmeterol, formoterol and Advair.
21. List two situations in which epinephrine may be administered.
22. Name an alpha-adrenergic drug used for its decongestant effects.
23. State the generic and trade names, indications, contraindications, modes of action, adverse reactions, routes of administration, dosages, hazards, and adverse reactions for each of the bronchodilators discussed in class.
24. State the most common diluent used to administer bronchodilators.
25. Explain the effects of hypotonic, hypertonic and isotonic solutions on the respiratory mucosa.
26. Given a bronchodilator, state whether it is a rescue or a maintenance medication.
27. Differentiate which bronchodilators can be given together.

V. **MODULE E - MUCOLYTICS**

A. **The student will be able to:**

1. List the three primary mucolytics.
2. List three clinical conditions which produce thick, tenacious mucus.
3. Describe the physiology of the three mucociliary layers.
4. Given a diagram of the three layers of the airway, identify surface epithelial cells and subepithelial cells.
5. Differentiate between mucus and sputum.
6. State the normal amount of mucous produced per day in a healthy person.
7. Describe the structure and composition of mucus.
8. State the three methods of mucolysis.
9. Define proteolysis.
10. Describe how n-acetylcysteine reduces the viscosity and elasticity of mucous.
11. State another alternate non-pulmonary use for oral administration of Acetylcysteine.
12. Describe how bicarbonate reduces the viscosity and elasticity of mucous.
13. Describe how dornase alfa reduces the viscosity and elasticity of mucous.
14. Define rhDNase.
15. State the generic and trade names, concentrations, modes of action, adverse reactions, routes of administration, dosages, and adverse reactions for each of the mucolytics discussed in class.
16. Describe the best way to facilitate physiologic clearance of mucous.

VI. MODULE F – MEDIATOR ANTAGONISTS AND STEROIDS

A. The student will be able to:

1. List a mast cell stabilizer.
2. Describe and diagram the antigen/antibody reaction on mast cells
3. Explain which antibody is elevated in allergic asthma.
4. List three mediators that are released with inflammation.
5. Explain the effects of chemical mediators such as histamine and leukotrienes on airway epithelium.
6. Given signs and symptoms, differentiate between the early and late phase of an inflammatory response.
7. Describe how cromolyn sodium is an anti-inflammatory agent.
8. State the generic and trade names, modes of action, adverse reactions, routes of administration, dosages, and adverse reactions for cromolyn sodium.
9. State the origin of corticosteroid secretion.
10. Describe why corticosteroids are now considered first line drugs in the treatment of asthma.
11. Describe the pathway for the release and control of corticosteroids in the body.
12. Define HPA insufficiency.
13. Differentiate between systemic and inhaled corticosteroids.
14. List three actions of steroids on inflammation.
15. Describe the process of weaning a patient from steroids.
16. List four side effects or adverse reactions of steroid administration.
17. State the trade and generic names of the inhaled steroids discussed in class.
18. Describe how a RCP can decrease the incidence of oral fungal infections when administering aerosolized steroids.
19. List three leukotrienes inhibitors discussed in class.
20. State two side effects of leukotrienes.
21. State how leukotrienes are administered.
22. Describe the cellular mechanism for leukotriene production.
23. State three medication types that are used for upper-airway congestion.
24. State the IgE inhibitor used to treat asthma.
25. State the proper order of administration when an inhaled steroid and bronchodilator are to be administered.

VII. **MODULE G – ANTI-INFECTIVE AGENTS, CHOLINERGICS, SURFACE TENSION REDUCING AGENTS, NICOTINE REPLACEMENT THERAPY, LOCAL ANESTHETIC AGENTS**

A. **The student will be able to:**

1. Define the following terms:
 - a. Antibiotic
 - b. Pathogen
 - c. Empiric
 - d. Normal flora
 - e. Aerobic
 - f. Anaerobic
 - g. Gram Stain
 - h. Culture and Sensitivity
 - i. Bacteriostatic
 - j. Bacteriocidal
 - k. Broad spectrum antibiotic
 - l. Mutagenic
 - m. Carcinogenic
 - n. Teratogenic
2. List an antibiotic used in the management of cystic fibrosis.
3. State the microorganism most commonly involved in lung infections in patients with cystic fibrosis.
4. State the generic and trade names, modes of action, adverse reactions, dosages, and routes of administration, for Ribavirin, Pentamidine, Tobramycin, and Colistin.
5. State the indication for pentamidine.
6. State the nebulizer used to deliver pentamidine.
7. Describe the risks to Health Care Providers to administer pentamidine.
8. Describe how pentamidine is prepared and administered.
9. State what particle size should be produced with a nebulizer used to administer pentamidine.
10. State the easiest way to prevent the transmission of RSV.
11. State the time of year RSV infections are mostly found.
12. Describe how ribavirin is administered.
13. State the indication for ribavirin.
14. State the nebulizer used to deliver ribavirin.
15. As outlined by the American Academy of Pediatrics, list those clinical conditions in which ribavirin would be indicated.
16. What do the initials RSV-IGIV stand for and under what name is it marketed?
17. State how RespiGam is administered.
18. State the indication for RespiGam.
19. List two common anti-fungal agents.
20. List four anti-tuberculosis medications.
21. Differentiate between the six-month and nine-month approach to treatment for tuberculosis exposure.
22. List two indications for lidocaine.
23. State what two concentrations are available for lidocaine for nebulization.
24. Describe the effects of nicotine on the autonomic nervous system.
25. List those agents used as an aid to smoking cessation for the relief of nicotine withdrawal.
26. Describe the administration of nicotine replacement agents.

27. List three precautions or additional instructions that should be provided to patients using nicotine replacement therapy.
28. State the drug used in the pulmonary function lab to perform Bronchoprovocation Testing.
29. State the indications for methacholine challenge testing.
30. Describe how Bronchoprovocation Testing is performed.
31. Describe the mode of action of methacholine.
32. State why emergency equipment should be readily available in the pulmonary function lab.
33. Describe when ethyl alcohol may be used to decrease surface tension in the clinical setting.
34. List three artificial surfactants.
35. List two hazards of surfactant therapy.
36. Differentiate between the natural and artificial surfactants.
37. Describe how a muscle contraction occurs and what neurotransmitter is primarily involved.
38. State two indications for use of a neuromuscular blocking agent.
39. Differentiate between paralysis and analgesia.
40. List three non-depolarizing neuromuscular blocking agents.
41. Describe the mechanism of action of the non-depolarizing blocking agents.
42. List the medications used to reverse non-depolarizing agents.
43. State the depolarizing neuromuscular blocking agent.
44. List the only depolarizing neuromuscular blocking agents.
45. Describe the mechanism of action of the depolarizing blocking agents.
46. List the medications used to reverse depolarizing agents.
47. State the indication for the use of muscle relaxants.
48. Differentiate between sedatives, hypnotics, and anxiolytics.
49. State the name of a short-acting benzodiazepine.
50. State the name of two long-acting benzodiazepines.
51. State two intravenous anesthetic agents used for short-term global amnesia in the ICU.
52. State three opioid narcotics.
53. Describe the effects of narcotics on the respiratory and cardiovascular system.
54. Describe how narcotics can be reversed.
55. Describe the function of anti-cholinesterase drugs.
56. List the two types of diuretics identified in class and give an example of when each is used.
57. Describe the side effect of diuretic administration.
58. List the medications that can be administered down the endotracheal tube (ALIEN-MV).

VIII. MODULE H - CARDIOVASCULAR AGENTS

A. The student will be able to:

1. Define the following terms:
 - a. Inotropic
 - b. Chronotropic
2. List those catecholamines classified as Inotropic Agents
3. State the formula for calculating blood pressure.
4. Describe how cardiac output is determined.
5. Describe how an increased or decreased systemic vascular resistance will affect blood pressure.
6. State the names and associated cardiac function of each of the waves seen on a normal ECG tracing.
7. Define:
 - a. Tachycardia
 - b. Bradycardia
8. State the primary drug used treat bradycardias.
9. State the calcium channel blocker used to decrease tachycardias.
10. List the primary antiarrhythmic drugs covered in class.
11. List the primary antihypotensive agents discussed in class.
12. State a vascular agent that is used in a hypertensive crisis.
13. State the beta-blocker used to treat hypertension.
14. Describe why bronchodilators may lose effectiveness when given to a patient on a beta-blocker therapy.
15. Define angina.
16. State the primary pharmacologic therapy used to treat angina.
17. Describe the pharmacologic action of ACE-inhibitor therapy.
18. List the cardiac glycosides and describe when they are indicated in the clinical setting.
19. Name two anticoagulants and an antidote for each.
20. Name the three thrombolytics used to treat myocardial infarctions, strokes and pulmonary embolism.

MACOMB COMMUNITY COLLEGE

RESPIRATORY THERAPY PROGRAM

RSPT 1200 WORKBOOK

PHARMACOLOGY