Component III: Clinical

Module C: Pharmacology

Topic 3: Preparing and Administering Medications

Statement of Purpose
To prepare the learner with necessary skills to safely prepare and administer medications.

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

1. Spell and define the key terms.
2. Calculate the correct dosage of a medication to be administered.
3. Administer oral medications.
4. Administer sublingual medications.
5. Administer buccal medications.
6. Administer inhalation medications.
7. Administer dermal medications.
8. Administer vaginal medications.
9. Administer rectal medications.
10. Administer transdermal medications.
11. Administer installation medications.
12. Administer parenteral medications; intradermal, subcutaneous and intramuscular injections.

Terminology
1. Adipose
2. Acromion process
3. Allergen
4. Ampule
5. Anaphylaxis
6. Applicator
7. Aspiration
8. Auricle
9. Canthus
10. Carpujet®
11. Cartridge
12. Cerumen
13. Conjunctiva
14. Contact dermatitis
15. Contraindication
16. Deltoid
17. Diluent
18. Dorsogluteal
19. Dry Powder Inhaler (DPI)
20. Gauge
21. Gluteal fold
22. Gluteus medius
23. Hypodermic syringe
24. Iliac crest
25. Iliac spine
26. Induration
27. Insulin syringe
28. Local effect
29. Mantoux
30. Metered dose inhaler (MDI)
31. Meniscus
32. Mydriatic
33. Ocular
34. Ophthalmic
35. Otic
36. Otoscope
37. Parenteral
38. Precipitate
39. Reconstitute
40. Regurgitation
41. Sciatic nerve
42. Sphincter

43. Systemic effect
44. Transdermal
45. Trochanter
46. Tuberculin syringe
47. Tubex®
48. Tympanic
49. Vastus lateralis
50. Vesicle
51. Vial
52. Wheal
53. Z-track method

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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 listed terms 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 **Calculate the correct dosage of medication to be administered.** A. Three systems of measurement 1. Metric. 2. Apothecary. 3. Household. B. Definitions of each system 1. Metric a. Used worldwide. b. Based on multiples of ten. c. Decimals often used to express the sum. d. Fractions are never used. e. Length expressed in meters. f. Weight expressed in grams. g. Volume is expressed in liters. h. Prefixes 1) Deca 2) Hecto 3) Kilo 4) Deci 5) Centi 6) Milli 2. Apothecary a. Oldest systems of measurement used when calculating drug dosages. This system originated in Greece, and eventually made its way to England where it was used during the late 1600s. b. Gradually being replaced by the metric system. c. Liquid measures 1) Drop (s) gt (t) 2) Minim (min, m) 3) Fluid dram (fl dr)	A. Lecture/Discussion B. Assigned Readings C. Select self-learning modules or workbooks. D. Have all three types of measures available for students to visualize and handle. E. Practice session in the classroom F. Prepare students for this section by giving them a skills test on basic math concepts (e.g. adding, subtracting, dividing, and multiplying.) G. Remediation may be required

4) Fluid ounce (fl oz) 5) Pint (pt) 6) Quart (qt) 7) Gallon (gal) d. Solid measures 1) Grain (gr) 2) Dram (dr) 3) Ounce (oz) 4) Pound (lb) 3. Household a. Used in cooking. b. Most common in the home. c. Sometimes needed to explain to patients. d. Measurement 1) Teaspoon (t) 2) Tablespoon (T) 3) Ounce 4) Cup 5) Pint 6) Gallon C. Converting measurements 1. Metric to metric a. Changing grams to milligrams. b. Changing micrograms to milligrams. 2. Apothecary to metric a. Change grains to grams. b. Change grains to milligrams. c. Change ounces to milliliters. D. Review of math skills used in calculating dosage of medications 1. Medication dosage is an exacting science a. Always ask questions when in doubt. b. Never be embarrassed to have someone check your calculations. 2. Formulas for calculating medication dosage a. Ratio and proportion; dose on hand: known quantity=dose desired: Unknown quantity b. Formula method desired on hand x quantity. E. Calculating pediatric dosages 1. Several methods available for calculating a. Nomogram 1) Using the Body Service Areas (BSA). 2) Considered the most accurate for • Children under age 12. • Adults with low body weight. 3) Chart includes • Height. • Surface area. • Weight.	

4) Formula • Body surface area (BSA) in square meters (m_2) X adult dose / 1.7 = child's dose • Young's rule: pediatric dose = child's age in years X adult dose – child's age in years X 12. • Clark's rule: pediatric dose = child's weight in pounds X adult doses 150 lbs.	
Objective 3 **Administer oral medications.** A. Advantages 1. Easily administered for patients with a normal swallow reflex. 2. Economical. B. Disadvantages 1. Odor. 2. Taste. 3. Discoloration of teeth. 4. Slower absorption time than other routes. C. Procedure 1. Wash hands. 2. Compare physician's order with drug label. 3. Calculate dosage to be given. 4. Remove cap, touching only the outside of the container. 5. Remove correct dose from the container a. Solid medication 1) Scored tablets may be broken for smaller dose. Use pill cutter for accuracy. 2) Never alter dose of a capsule. 3) Administer from unit dose package or from medication cup. 4) Avoid touching the medication with your fingers/hands. b. Liquid medication 1) Open bottle, placing cap open end up. 2) Pour from opposite side of the label "palm the label" (to prevent damage to the label.) 3) Place the medication cup at eye level. 4) Measure from the bottom of the meniscus. 6. Greet and identify the patient.	A. Lecture/Discussion B. Assigned Readings C. Assemble supplies and assorted medications for student practice. D. See essential steps E. Provide samples of patient chart forms. F. Demonstrate the correct procedure for documenting medication administration.

7. Explain procedure. 8. Provide water to assist in swallowing. 9. Remain with patient until medication is taken. 10. Observe the patient for any unusual symptoms. 11. Document the procedure.	
Objective 4 **Administer sublingual medications.** A. Procedure for administering 1. Wash hands. 2. Identify medication and compare to the Physician's order. 3. Identify the patient. 4. Instruct the patient a. Place medication under the tongue. b. Hold there until dissolved. c. Do not drink or eat until medication is dissolved. d. Must not be swallowed. B. Document the procedure.	A. Lecture/Discussion B. Assigned Readings
Objective 5 **Administer buccal medications.** A. Procedure 1. Wash hands. 2. Identify medication and compare to the Physician's order. 3. Identify the patient. 4. Instruct the patient. a. Place medication in the pouch between cheek and gum at the side of the mouth. b. Hold medication there until it is dissolved. c. Do not drink or eat until dissolved. d. Must not be swallowed. B. Document the procedure.	A. Lecture/Discussion B. Assigned Readings
Objective 6 **Administer inhalation medications.** A. Review anatomy of respiratory system. B. Types of medications administered 1. Water vapors. 2. Gases. C. Absorbed by the alveolar walls into the capillaries. D. Existing pathology may block absorption. E. Procedures 1. Hand held nebulizers a. Plug in nebulizer to a grounded outlet. b. Placed ordered medication in the nebulizer cup and secure the cap. c. Attach tubing to the nebulizer cup and nebulizer. d. Have patient to hold mouth piece between	A. Lecture/Discussion B. Assigned Readings C. Use diagrams from online websites to review anatomy www.innerbody.com D. Provide samples of equipment. E. Demonstrate the procedure for documenting inhalation medications.

teeth and lips with lips pursed around the mouth piece. e. Encourage patient to take slow deep breaths through the mouth and hold each breath for 2-3 second. f. Continue treatment until aerosol is no longer produced approximately ten minutes. g. Turn off the nebulizer. h. Encourage patient to cough to loosen secretions. i. Dispose of mouthpiece and tubing. j. Wash hands. k. Document procedure. l. Instruct patient. 2. Metered dose inhaler a. Check doctor's order. b. Wash your hands. c. Remove the end cap from the mouthpiece of the inhaler. d. Remove the cap from the end of the spacer and attach the spacer to the mouthpiece. e. Shake the inhaler well. This mixes the medicine with the propellants. f. Have patient exhale. g. Have the patient close lips tightly around the mouthpiece of the spacer and press down firmly on the top of the canister to release one "puff" of medicine. h. Ask patient to start to inhale slowly. i. Have patient continue to breathe in as slowly and as deeply they can manage. j. Have the patient take the spacer out of their mouth. k. Have patient hold breath for the count of ten. 3. Dry powder inhaler a. Prepare the DPI, remove the cover or cap from DPI. b. Load a dose of medicine, DPI may have a lever that slides or a piece that twists until it clicks. Your DPI may have an opening that the medicine is pushed into. c. Turn head to the side and exhale as much they can; lungs should be as empty as possible right before the medicine is inhaled. d. Close lips firmly around the DPI to prevent air or medicine from coming out the sides.	

Make sure the tongue does not block the opening of the DPI. Inhale deeply through mouth. Breathe as deeply as possible. e. Remove the DPI from mouth, hold breath for ten seconds or longer. This will hold the medicine inside the airways and lungs. Slowly exhale. f. Repeat as needed until the correct number of doses is taken. Wait one minute between each dose. 4. Oxygen check Physician's order a. Assess respiratory condition 1) Rate. 2) Rhythm. 3) Difficulty in breathing. 4) Vital signs. b. Face mask 1) Fit snug on face. 2) Rate 8 to 15 liters per minute. c. Nasal cannula 1) Fits into nose. 2) Instruct patient to breathe through the nose. 3) Rate of 2 liters per minute. 4) Higher than 5 liters per minute can be drying to the nasal membranes. F. Key points to remember 1. Do not expose oxygen equipment to electrical appliances. 2. Do not use acetone or alcohol in the presence of oxygen. 3. Do not use oil or grease on oxygen equipment. 4. Do not lay things over an oxygen tank. 5. No flammable substances in the area. 6. Post "no smoking, oxygen in use" signs. 7. Patients must not smoke. 8. Transport oxygen tanks on a secured platform carrier. 9. Document the procedure.	
Objective 7 **Administer dermal medications.** A. Applied to the skin. B. Includes 1. Creams. 2. Lotions. 3. Ointments. C. Produces localized effects 1. Coating. 2. Soothing. D. Procedure	A. Lecture/Discussion B. Assigned Readings C. Collect samples for students to see and read labels. D. Demonstrate the procedure for documenting the administration of a dermal medication.

1. Wash hands. 2. Put on nonsterile gloves. 3. Prepare medication. 4. Apply a thin layer of medication to the surface of the skin. 5. Discard gloves. 6. Wash hands. 7. Document the procedure.	
Objective 8 **Administer vaginal medications.** A. Inserted into vagina. B. Includes 1. Creams. 2. Tablets. 3. Cocoa base suppositories. 4. Solutions. C. Medications contain 1. Hormonal creams. 2. Antibiotics. 3. Antifungal. D. Procedure 1. Wash hands. 2. Put on nonsterile gloves. 3. Prepare medication. 4. Insert the full length of the vagina. 5. Discard gloves. 6. Wash hands. E. Instruct the patient 1. Remain lying for a period of time after insertion. 2. Daily dose usually inserted at bedtime. 3. For comfort wear a light pad to absorb drainage. F. Document the procedure.	A. Lecture/Discussion B. Assigned Readings C. Use diagrams for anatomy D. Demonstrate the procedure for documenting the administration of a vaginal medication.
Objective 9 **Administer rectal medications** A. Inserted into the rectum past the internal anal sphincter. B. Includes 1. Suppositories. 2. Enemas. C. Provide local or systemic effect. D. May be used for patients with nausea or NPO. E. May need lubrication with lubricating gel. F. Never use petroleum 1. Interferes with absorption. 2. Damages the mucosa. G. Enemas and suppositories should be retained for 20-30 minutes before elimination. H. Procedure 1. Wash hands. 2. Put on nonsterile gloves. 3. Prepare medication.	A. Lecture/Discussion B. Assigned Readings C. Use diagram for anatomy D. Demonstrate the procedure for documenting the administration of a rectal medication.

4. Insert into the rectum past the internal anal sphincter. 5. Discard gloves. 6. Wash hands. 7. Document the procedure.	
Objective 10 **Administer transdermal medications** A. Patch 1. Adhesive disk 2. Impregnated with medication B. Apply to 1. Clean dry skin area a. Upper arms and legs b. Chest c. Back d. Behind the ear C. Examples of medication 1. Nitroglycerin 2. Scopolamine 3. Estrogen 4. Nicotine D. Slow release of medication E. Absorbed through bloodstream F. Procedure 1. Wash hands 2. Put on nonsterile gloves 3. Prepare medication. 4. Attach adhesive medicated disk to skin surface 5. Wash hands 6. Document the procedure G. Sub-dermal implants H. Example: IMPLANON® (birth control) I. Capsule or rod of medication J. Inserted by Physician K. Implanted under skin in upper or lower arm L. Local anesthetic used for implants	A. B. C. Lecture/Discussion D. Assigned Readings E. Have samples for students to see. F. Demonstrate the procedure for documenting transdermal medication.
Objective 11 **Administer installation medications.** A. Instilled medication 1. Eye. 2. Ear. B. Eye 1. Review anatomy of the eye. 2. Procedure a. Check medication order carefully. b. Error prone abbreviations for eyes (OD-right, OS-left, and OU-both) should not be used. c. Wash hands. d. Put on personal protection equipment as	A. Lecture/Discuss B. Assigned Readings C. Have samples of medications for students to see. D. Use diagrams from online sources to review anatomy www.innerbody.com E. Demonstrate the procedure and documenting for instillation of eye drops. F. Have students role-play. G. Demonstrate the correct

needed or as policy dictates. e. Follow guidelines for safe medication administration 1) Read label three times. 2) Ask patient to identify self. 3) Instruct the patient regarding procedure. f. Position in supine or sitting position. g. Stand at patient's head. h. Withdraw medication into dropper. i. Gently open eye using tissue, lower lid down gently. j. Hold the dropper parallel to the eye about half inch from inner canthus. k. Instill the drop(s) into the center of the conjunctival sac of the lower lid. l. Instruct the patient close eyelid gently. Avoid squeezing. m. Wipe excess with tissue. n. Discard unused medication. o. Apply patch to eye if ordered. p. Discard gloves. q. Wash hands. r. Document the procedure. C. Ear 1. Review anatomy of the ear. 2. Procedure a. Check the medication carefully. b. Wash hands. c. Put on personal protective equipment as need or as policy dictates. d. Follow guidelines for safe administration of medications 1) Read label three times. 2) Ask patient to identify self. 3) Instruct the patient regarding the procedure. e. Position patient in sitting or side lying position. f. Instruct the patient to tilt head toward the unaffected side. g. Stand at the patient's head. h. Withdraw the medication into the dropper. i. Straighten the external ear canal 1) Adult, gently pull top of ear lobe upward and backward. 2) Children, gently pull bottom of the earlobe downward and backward. j. Place tip of dropper just slightly inside the external meatus and instill the correct dosage.	procedure for instillation of medication in the ear.

	k. Instruct patient to keep the head tilted. l. Place a cotton ball over opening of the ear only if ordered. m. Discard unused medication. n. If dropper is contaminated, replace the dropper. Do not put it back into bottle. o. Remove and discard gloves. p. Wash hands. q. Document the procedure.	

Objective 12
Administer parenteral medications; intradermal, subcutaneous and intramuscular injections

A. Parenteral Administration
   1. The injection of a liquid substance into the body via a route other than the alimentary canal.
   2. Methods of administration
      a. Intradermal injections.
      b. Subcutaneous injections.
      c. Intramuscular injections.
   3. Reasons Physicians order injections
      a. Achieve rapid response.
      b. Guarantee the accuracy of dosage.
      c. Concentrate medication to a specific area of body.
      d. Local anesthetic.
      e. Some medications cannot be absorbed in the alimentary canal.
      f. Patient is nauseated.
   4. Dangers and complications associated with injections
      a. Injury to superficial nerves or blood vessels.
      b. Bleeding at the site of injection.
      c. Introduction of an infection.
      d. Breaking a needle in the tissue.
      e. Accidentally injecting medication into a blood vessel.
      f. Hitting the bone.
      g. Allergic reactions.
      h. Toxic effects of medication.
   5. Body areas to avoid when administering injections
      a. Burned areas.
      b. Scar tissue.
      c. Edematous areas.
      d. Cyanotic areas.
      e. Traumatized areas.
      f. Areas near large blood vessels nerve and bones.
      g. Areas where there have been a change in skin texture and pigmentation.
      h. Where there are growths such as a mole or wart.
   6. Supplies and equipment
      a. Syringes
         1) Made of disposable plastic.
         2) Sizes
            - 3 mL (most common size.)
            - 5 mL.
            - 10 mL and larger.
            - Specialty types
               - Insulin.
               - Tuberculin.

A. Lecture/Discuss
B. Assigned Readings
C. Have examples of equipment present for the learner to see and handle.
D. Demonstrate technique for disposing of syringes and needles.