

UNIT TERMINAL OBJECTIVE

- 1-8 At the completion of this unit, the paramedic student will be able to safely and precisely access the venous circulation and administer medications.

COGNITIVE OBJECTIVES

At the completion of this unit, the paramedic student will be able to:

- 1-8.1 Review the specific anatomy and physiology pertinent to medication administration. (C-1)
- 1-8.2 Review mathematical principles. (C-1)
- 1-8.3 Review mathematical equivalents. (C-1)
- 1-8.4 Differentiate temperature readings between the Centigrade and Fahrenheit scales. (C-3)
- 1-8.5 Discuss formulas as a basis for performing drug calculations. (C-1)
- 1-8.6 Discuss applying basic principles of mathematics to the calculation of problems associated with medication dosages. (C-1)
- 1-8.7 [Describe how to perform mathematical conversions from the household system to the metric system. \(C-1\)](#)
- 1-8.8 Describe the indications, equipment needed, technique used, precautions, and general principles of peripheral venous or external jugular cannulation. (C-1)
- 1-8.9 Describe the indications, equipment needed, technique used, precautions, and general principles of intraosseous needle placement and infusion. (C-1)
- 1-8.10 Discuss legal aspects affecting medication administration. (C-1)
- 1-8.11 Discuss the "six rights" of drug administration and correlate these with the principles of medication administration. (C-1)
- 1-8.12 Discuss medical asepsis and the differences between clean and sterile techniques. (C-1)
- 1-8.13 Describe use of antiseptics and disinfectants. (C-1)
- 1-8.14 Describe the use of universal precautions and body substance isolation (BSI) procedures when administering a medication. (C-1)
- 1-8.15 Differentiate among the different dosage forms of oral medications. (C-3)
- 1-8.16 Describe the equipment needed and general principles of administering oral medications. (C-3)
- 1-8.17 Describe the indications, equipment needed, techniques used, precautions, and general principles of administering medications by the inhalation route. (C-3)
- 1-8.18 Describe the indications, equipment needed, techniques used, precautions, and general principles of administering medications by the gastric tube. (C-3)
- 1-8.19 Describe the indications, equipment needed, techniques used, precautions, and general principles of rectal medication administration. (C-3)
- 1-8.20 Differentiate among the different parenteral routes of medication administration. (C-3)
- 1-8.21 Describe the equipment needed, techniques used, complications, and general principles for the preparation and administration of parenteral medications. (C-1)
- 1-8.22 Differentiate among the different percutaneous routes of medication administration. (C-3)
- 1-8.23 Describe the purpose, equipment needed, techniques used, complications, and general principles for obtaining a blood sample. (C-1)
- 1-8.24 Describe disposal of contaminated items and sharps. (C-1)
- 1-8.25 Synthesize a pharmacologic management plan including medication administration. (C-3)
- 1-8.26 Integrate pathophysiological principles of medication administration with patient management. (C-3)

AFFECTIVE OBJECTIVES

At the completion of this unit, the paramedic student will be able to:

- 1-8.27 Comply with paramedic standards of medication administration. (A-1)

- 1-8.28 Comply with universal precautions and body substance isolation (BSI). (A-1)
- 1-8.29 Defend a pharmacologic management plan for medication administration. (A-3)
- 1-8.30 Serve as a model for medical asepsis. (A-3)
- 1-8.31 Serve as a model for advocacy while performing medication administration. (A-3)
- 1-8.32 Serve as a model for disposing contaminated items and sharps. (A-3)

PSYCHOMOTOR OBJECTIVES

At the completion of this unit, the paramedic student will be able to:

- 1-8.33 Use universal precautions and body substance isolation (BSI) procedures during medication administration. (P-2)
- 1-8.34 Demonstrate cannulation of peripheral or external jugular veins. (P-2)
- 1-8.35 Demonstrate intraosseous needle placement and infusion. (P-2)
- 1-8.36 Demonstrate clean technique during medication administration. (P-3)
- 1-8.37 Demonstrate administration of oral medications. (P-2)
- 1-8.38 Demonstrate administration of medications by the inhalation route. (P-2)
- 1-8.39 Demonstrate administration of medications by the gastric tube. (P-2)
- 1-8.40 Demonstrate rectal administration of medications. (P-2)
- 1-8.41 Demonstrate preparation and administration of parenteral medications. (P-2)
- 1-8.42 Demonstrate preparation and techniques for obtaining a blood sample. (P-2)
- 1-8.43 Perfect disposal of contaminated items and sharps. (P-3)

DECLARATIVE

- I. Review of mathematical principles
 - A. Multiplication and division
 - B. Roman numerals
 - C. Fractions
 - D. Decimal fractions
 - E. Proportions
 - F. Percent

- II. Mathematical equivalents used in pharmacology
 - A. The metric system
 - B. [Conversions between the household and metric system](#)
 - C. Fahrenheit scale for temperature reading
 - D. Celsius (centigrade) scale for temperature reading
 - E. Converting between Fahrenheit and Celsius temperatures

- III. Calculating drug dosages
 - A. Calculation methods
 - 1. Fraction method
 - 2. Ratio method
 - 3. Desired dose over available concentration method
 - B. Calculating dosages
 - 1. Oral medications
 - a. Capsules and tablets
 - b. Liquids
 - 2. Parenteral medications
 - a. Quantity (typically weight)
 - b. Volume
 - c. Units (e.g., insulin)
 - 3. Intravenous infusions
 - a. Flow rates
 - b. Flow rates for infants and children
 - c. Total infusion time
 - d. Other factors influencing flow rates
 - 4. Calculating dosages for infants and children
 - a. Body weight
 - b. Body surface area (BSA)
 - c. Use of tables, charts, and other adjuncts
 - d. Length-based resuscitation tapes

- IV. Medical direction
 - A. Medication administration is bound by the paramedic's on-line or off-line medical direction
 - B. Role of the medical director
 - C. Patient management protocols
 - 1. Written standing orders
 - D. Legal considerations - policies and procedures which specify regulations of medication administration

- V. Principles of medication administration
 - A. Local drug distribution system - policies which establish stocking and supply of drugs
 - B. Paramedic's responsibility associated with the drug order
 - 1. Verification of the drug order
 - C. The "six rights" of medication administration
 - 1. "Right" patient
 - 2. "Right" drug
 - 3. "Right" dose
 - 4. "Right" route
 - 5. "Right" time
 - 6. "Right" documentation

- VI. Medical asepsis
 - A. Clean technique versus sterile technique
 - B. Sterilization
 - C. Antiseptics
 - D. Disinfectants

- VII. Universal precautions and body substance isolation (BSI) in medication administration

- VIII. Venous access
 - A. Intravenous cannulation
 - 1. General principles
 - 2. Types
 - a. Peripheral
 - (1) General principles
 - (2) Indications
 - (3) Precautions
 - (4) Equipment
 - (5) Technique
 - (a) Extremity
 - i) Indications
 - ii) Precautions
 - iii) Equipment
 - iv) Procedure
 - (b) External jugular
 - i) Indications
 - ii) Precautions
 - iii) Equipment
 - iv) Procedure
 - b. Central
 - B. Intraosseous needle placement and infusion
 - 1. General Principles
 - 2. Indications
 - 3. Precautions
 - 4. Equipment
 - 5. Technique

- IX. Medication administration by the inhalation route
 - A. Bronchodilators (beta agonist) medications
 - 1. Other medications
 - B. Equipment
 - 1. Oxygen or compressed air source
 - 2. Small volume nebulizer (SVN)
 - a. Other inhaler equipment
 - b. Other adapter equipment
 - c. Modified inhaler equipment
 - C. Administering medications by the inhalation route
 - 1. Indications
 - 2. Techniques
 - 3. Precautions
 - 4. General principles of administering medications by the inhalation route

- X. Enteral medication administration
 - A. Oral administration of medications
 - 1. Dosage forms of solid-form and liquid-form oral medications
 - a. Capsules
 - b. Time-released capsules
 - c. Lozenges
 - d. Pills
 - e. Tablets
 - f. Elixirs
 - g. Emulsions
 - h. Suspensions
 - i. Syrups
 - 2. Equipment
 - a. Souffle cup
 - b. Medicine cup
 - c. Medicine dropper
 - d. Teaspoons
 - e. Oral syringes
 - f. Nipples
 - 3. General principles for administration of solid-form and liquid-form oral medications
 - B. Administration of medications by the gastric tube
 - 1. Indications for administering medications by the gastric tube
 - a. Nasogastric tube
 - b. Orogastric tube
 - 2. Required equipment
 - 3. Techniques used
 - 4. Precautions
 - 5. General principles for administration of medications by the gastric tube
 - C. Rectal administration of medications
 - 1. Indications for rectal administration of medications
 - 2. Required equipment
 - 3. Techniques used
 - 4. Precautions

5. General principles for rectal administration of medications
- XI. Parenteral administration of medications
- A. Parenteral routes
 1. Intradermal
 2. Subcutaneous
 3. Intramuscular
 4. Intravenous
 5. Intraosseous
 6. Percutaneous
 - B. Reasons for parenteral administration of medications
 - C. Equipment used in parenteral administration of medications
 1. Syringes
 - a. Calibration of the syringe
 - b. Prefilled syringes
 2. Needles
 - a. Parts of the needle
 3. Selection of the syringe and needle
 4. Packaging of syringes and needles
 5. Packaging of parenteral medications
 - a. Ampules
 - b. Vials
 - c. Prefilled syringes
 - d. Other
 6. Intravenous (IV) administration sets
 - a. Various types
 - b. Macrodrip chamber-type
 - c. Microdrip chamber-type
 - d. Variety of extensions and other pieces of equipment
 - e. Some IV administration sets are manufacturer specific
 7. Intravenous (IV) solutions
 - a. Types of containers
 - b. Variety of volumes
 8. "Piggyback" administration
 - a. Primary IV infusion
 - b. Secondary IV infusion
 - c. Related equipment to connect secondary infusion to primary infusion
 9. Volume control intravenous set
 - a. Various brands
 - D. Preparation of parenteral medication
 1. Equipment needed for preparing a parenteral medication
 2. Standard procedures for preparing all parenteral medications
 3. Guidelines for preparing medications
 - a. To prepare a medication from an ampule
 - b. Reconstitution of a sterile powder
 - c. Removal of a volume of liquid from a vial
 - d. Preparing a drug from a mix-o-vial
 - e. Preparing two medications in one syringe

- E. Administration of medication by the intradermal route
 - 1. Intradermal route: injections are made into the dermal layer of skin just below the epidermis
 - 2. Equipment needed for administration of a medication by the intradermal route
 - 3. Locate anatomical sites
 - 4. Technique for administration of medication by the intradermal route
 - 5. Documentation
- F. Administration of medication by the subcutaneous route
 - 1. Subcutaneous route: injections are made into the loose connective tissue between the dermis and muscle layer
 - 2. Equipment needed for administration of a medication by the subcutaneous route
 - 3. Locate anatomical sites
 - a. Upper arms
 - b. Anterior thighs
 - c. Abdomen
 - d. Sublingual
 - 4. Technique for administration of medication by the subcutaneous route
 - 5. Precautions
- G. Administration of medication by the intramuscular route
 - 1. Intramuscular route - injections are made by penetrating a needle through the dermis and subcutaneous tissue into the muscle layer
 - 2. Equipment needed for administration of a medication by the intramuscular route
 - 3. Locate anatomical sites for adults and children
 - a. Vastus lateralis muscle
 - b. Rectus femoris muscle
 - c. Gluteal area
 - d. Deltoid muscle
 - 4. Technique for administration of medication by the intramuscular route
 - 5. Precautions
- H. Administration of medication by the intravenous route
 - 1. Intravenous route
 - a. Places the drug directly into the bloodstream
 - b. Bypasses all barriers to drug absorption
 - 2. Drugs may be administered by direct injection with a needle and syringe, but more commonly drugs are given intermittently or by continuous infusion through an established peripheral or central line
 - 3. Purpose for a peripheral IV site
 - 4. Purpose for a central IV site
 - 5. Dosage forms for IV administration
 - 6. Equipment needed for administration of a medication by the peripheral or central IV route
 - 7. Anatomical sites for adults, children, and infants
 - a. Peripheral access
 - b. Central access
 - 8. General principles of IV medication administration
 - 9. Preparing an IV solution for infusion
 - a. Equipment
 - b. Technique
 - c. Warming or cooling an IV solution, as indicated
 - 10. Adding medication to an existing IV solution

11. Steps in performing venipuncture
 12. Steps in performing administration of medications into an established IV line
 13. Steps in performing administration of medication by a heparin lock
 14. Steps in adding a medication to an IV bag, bottle, or volume control
 15. Steps in adding a medication with a piggyback or secondary set
 16. Steps in changing to the next container of IV solution
 17. Steps in administering medication by a venous access device
 - a. Equipment
 - b. Technique
 18. Steps to discontinue an intravenous infusion
 - a. Equipment
 - b. Technique
 19. Steps in monitoring IV therapy
 - a. Various types of infusion pumps
 20. Complications
 - a. Phlebitis or infection
 - b. Extravasation
 - c. Air in tubing
 - d. Circulatory overload and pulmonary edema
 - e. Allergic reaction
 - f. Pulmonary embolism
 - g. Failure to infuse properly
- I. Administration of percutaneous medications
1. Percutaneous route - application of a medication for absorption through the mucous membranes or skin
 2. Factors which influence the amount of medication absorbed through the skin or mucous membranes
 3. Methods of percutaneous administration of medications
 4. Steps in preparing percutaneous medications
 5. Topical medications - applied directly to the area of skin requiring treatment
 - a. Common forms of topical medications
 - b. Steps in administering topical medications
 6. Administering medications to mucous membranes
 - a. Places where medications are commonly applied
 - (1) Under the tongue (sublingual)
 - (2) Against the cheek (buccal)
 - (3) In the eye
 - (4) In the nose
 - (5) In the ear
 - (6) Inhaled into the lungs
 - (a) Through an aerosol or nebulizer
 - (b) Through positive pressure ventilation
 - b. Dosage forms
 - (1) Tablets
 - (2) Drops
 - (3) Ointments
 - (4) Creams
 - (5) Suppositories

- (6) Metered-dose inhalers
 - c. Equipment needed for administration of each type of medication
 - d. Steps for the administration of the dosage form of medication to the place it is commonly applied
 - J. Administration of medication by the intraosseous route
 - 1. Any solution or drug that can be administered intermittently or by continuous infusion can be administered by the intraosseous route
 - 2. Purpose for the intraosseous route
 - a. Shock
 - b. Status epilepticus
 - c. Other conditions
 - 3. Equipment needed
 - 4. Anatomical sites
 - 5. General principles of administering solution or medication administration via the intraosseous route
 - 6. Steps in establishing an intraosseous route for an IV solution or medication administration
 - 7. Steps in performing administration of medications by the intraosseous route
 - a. Need for injection of medication with saline flush
 - b. Need for administration of fluids
 - 8. Steps to discontinue an intraosseous infusion
 - a. Equipment
 - b. Technique
 - 9. Complications
 - a. Phlebitis or infection
 - b. Extravasation
 - c. Compartment syndrom
 - d. Fracture
 - e. Air embolism due to air in tubing
 - f. Pulmonary embolism due to marrow particles (bone and fat)
 - g. Circulatory overload and pulmonary edema
 - h. Allergic reaction
 - i. Failure to flush the intraosseous needle
 - j. Failure to infuse properly
- XII. Obtaining a blood sample
 - A. Purposes for obtaining a blood sample
 - B. Equipment needed for obtaining a blood sample
 - C. Locations from which to obtain a blood sample
 - 1. Anatomical sites
 - 2. From the established intravenous catheter
 - 3. Other locations
 - D. Steps to preparing equipment for obtaining a blood sample
 - E. Techniques for obtaining a blood sample
 - F. Complications
- XIII. Disposal of contaminated items and sharps
 - A. Follow local protocol for disposal of contaminated items and sharps