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UNIT TERMINAL OBJECTIVE

1-4 At the completion of this unit, the EMT-Critical Care Technician student will be able to safely and precisely access the venous circulation and administer medications.

COGNITIVE OBJECTIVES

At the completion of this unit, the EMT-Critical Care Technician student will be able to:

1-4.1 Review the specific anatomy and physiology pertinent to medication administration. (C-1)
1-4.2 Review mathematical principles. (C-1)
1-4.3 Review mathematical equivalents. (C-1)
1-4.4 Differentiate temperature readings between the Centigrade and Fahrenheit scales. (C-3)
1-4.5 Discuss formulas as a basis for performing drug calculations. (C-1)
1-4.6 Calculate oral and parenteral drug dosages for all emergency medications administered to adults, infants and children. (C-2)
1-4.7 Calculate intravenous infusion rates for adults, infants, and children. (C-2)
1-4.8 Discuss legal aspects affecting medication administration. (C-1)
1-4.9 Discuss the "six rights" of drug administration and correlate these with the principles of medication administration. (C-1)
1-4.10 Discuss medical asepsis and the differences between clean and sterile techniques. (C-1)
1-4.11 Describe use of antiseptics and disinfectants. (C-1)
1-4.12 Describe the use of universal precautions and body substance isolation (BSI) procedures when administering a medication. (C-1)
1-4.13 Describe the indications, equipment needed, techniques utilized, precautions, and general principles of peripheral venous cannulation **(Including saline locks)**. (C-1)
1-4.14 Describe the indications, equipment needed, techniques utilized, precautions, and general principles of intraosseous needle placement and infusion. (C-1)
1-4.15 Describe the indications, equipment needed, techniques utilized, precautions, and general principles of administering medications by the inhalation route **(Including endotracheal route)**. (C-3)
1-4.16 Differentiate among the different dosage forms of oral medications. (C-3)
1-4.17 Describe the equipment needed and general principles of administering oral medications. (C-3)
1-4.18 Describe the indications, equipment needed, techniques utilized, precautions, and general principles of rectal medication administration. (C-3)
1-4.19 Differentiate among the different parenteral routes of medication administration. (C-3)
1-4.20 Describe the equipment needed, techniques utilized, complications, and general principles for the preparation and administration of parenteral medications. (C-1)
1-4.21 Differentiate among the different percutaneous routes of medication administration. (C-3)
1-4.22 Describe the purpose, equipment needed, techniques utilized, complications, and general principles for obtaining a blood sample. (C-1)
1-4.23 Describe disposal of contaminated items and sharps. (C-1)
1-4.24 Synthesize a pharmacologic management plan including medication administration. (C-3)
1-4.25 Integrate pathophysiological principles of medication administration with patient management. (C-3)

AFFECTIVE OBJECTIVES

At the completion of this unit, the EMT-Critical Care Technician student will be able to:

1-4.26 Comply with EMT-Critical Care Technician standards of medication administration. (A-1)
1-4.27 Comply with universal precautions and body substance isolation (BSI). (A-1)
1-4.28 Defend a pharmacologic management plan for medication administration. (A-3)
1-4.29 Serve as a model for medical asepsis. (A-3)

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1-4.30 Serve as a model for advocacy while performing medication administration. (A-3)
1-4.31 Serve as a model for disposing of contaminated items and sharps. (A-3)

PSYCHOMOTOR OBJECTIVES

At the completion of this unit, the EMT-Critical Care Technician student will be able to:

1-4.32 Use universal precautions and body substance isolation (BSI) procedures during medication administration. (P-2)
1-4.33 Demonstrate cannulation of peripheral veins **(Including saline locks)**. (P-2)
1-4.34 Demonstrate intraosseous needle placement and infusion. (P-2)
1-4.35 Demonstrate clean technique during medication administration. (P-3)
1-4.36 Demonstrate administration of medications by the inhalation route **(Including endotracheal route)**. (P-2)
1-4.37 Demonstrate administration of oral medications. (P-2)
1-4.38 Demonstrate rectal administration of medications. (P-2)
1-4.39 Demonstrate preparation and administration of parenteral medications. (P-2)
1-4.40 Demonstrate preparation and techniques for obtaining a blood sample. (P-2)
1-4.41 Perfect disposal of contaminated items and sharps. (P-3)

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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. Fahrenheit scale for temperature reading
   - C. Celsius (centigrade) scale for temperature reading
   - D. 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 (i.e. insulin)
     3. Intravenous infusions
        - a. Flow rates
        - b. Flow rates for infants and children
     4. Calculating dosages for infants and children
        - a. Body weight
        - b. Use of tables, charts, and other adjuncts
        - c. Length-based resuscitation tapes

IV. Medical direction
   - A. Medication administration is bound by the EMT-Critical Care Technician'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. EMT-Critical Care Technician's responsibility associated with the drug order

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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. Peripheral intravenous cannulation
1. General principles
2. Indications
3. Precautions
4. Equipment
5. Technique
a. Extremity
(1) Indications
(2) Precautions
(3) Equipment
(4) Procedure
b. External jugular
(1) Indications
(2) Precautions
(3) Equipment
(4) Procedure
c. <u>Saline locks</u>
<u>(1) Indications</u>
<u>(2) Precautions</u>
<u>(3) Equipment</u>
<u>(4) Procedure</u>

B. Intraosseous needle placement and infusion
1. General principles
2. Indications
3. Precautions
4. Equipment
5. Technique

IX. Medications administered by the inhalation route
A. Bronchodilator (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 for administering medications by the inhalation route

D. Administering medications by the endotracheal tube
1. Indications
2. Techniques
3. Precautions
4. General principles for administering medications by the endotracheal tube

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. Rectal administration of medications
1. Indications for rectal administration of medications
2. Required equipment
3. Techniques utilized
4. Precautions
5. General principles for rectal administration of medications

XI. Parenteral administration of medications
A. Parenteral routes used by EMT-Critical Care Technicians
1. Subcutaneous
2. Intramuscular

3. Intravenous bolus
4. Intraosseous
5. Sublingual

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. 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. Prefilled syringes
   b. To prepare a medication from an ampule
   c. Removal of a volume of liquid from a vial
   d. Preparing a drug from a mix-o-vial

E. 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 injection
4. Technique for administration of medication by the subcutaneous route
5. Precautions

F. 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

G. Administration of medication by intravenous **route**
1. Intravenous route
   a. Places the drug directly into the bloodstream
   b. Bypasses all barriers to drug absorption
2. Drugs are administered by direct injection with a needle and syringe into an established peripheral IV line **or are given intermittently or by continuous infusion through an established peripheral line.**
3. Dosage forms for IV administration
4. General principles of IV medication administration
5. Steps in performing administration of medications into an established IV line
6. Steps in performing administration of medication by a heparin**/saline** lock
7. **Steps in adding a medication to an IV bag, bottle, or volume control**
8. **Steps in adding a medication with a piggyback or secondary set**
9. Steps in changing to the next container of IV solution
10. Steps in administering medication by a venous access device
    a. Equipment
    b. Technique
11. Complications
    c. Phlebitis or infection
    d. Extravasation
    e. Air in tubing
    f. Circulatory overload and pulmonary edema
    g. Allergic reaction
    h. Pulmonary embolism
    i. Failure to infuse properly

H. Administration of medication by the intraosseous route
1. Any IV solution or drug that 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 an IV solution or medication administration via the intraosseous route
6. 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
7. Complications
   a. Phlebitis or infection

b. Extravasation
c. Compartment syndrome
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

I. Administering medications by the sublingual route
1. Places where medications are commonly applied
a. Under the tongue (sublingual)
b. Against the cheek (buccal)
c. Dosage forms
(1) Tablets
(2) Liquid/Spray

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