

Medication Administration Education Program

Division of Mental Health/Developmental Disabilities/Substance Abuse Services

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DIVISION OF MENTAL HEALTH/DEVELOPMENTAL DISABILITIES/SUBSTANCE ABUSE SERVICES

STANDARDS FOR ADMINISTRATION OF MEDICATIONS BY REGISTERED NURSES AND LICENSED PRACTICAL NURSES

Registered Nurse (RN) and Licensed Practical Nurse (LPN) staff members in all Division of Mental Health/Developmental Disabilities/Substance Abuse Services (DMH/DD/SAS) facilities shall demonstrate clinical competencies to administer medications. Clinical competencies for RNs and LPNs shall be based on successful completion of the DMH/DD/SAS Medication Administration Examination (theory and practicum).

An education program on medication administration shall be made available by the facility to assist nursing staff in passing the examination. Tutoring and study packages may be used when appropriate.

PROGRAM REQUIREMENT:

The educational program is the DMH/DD/SAS standardized curriculum which includes both theoretical and clinical components.

FACULTY REQUIREMENTS:

- A. The classroom and clinical instructor(s) must be registered nurses (RNs) with a current North Carolina nursing license, be in good standing with the Board of Nursing and have experience in administration of medication in a DMH/DD/SAS facility or comparable agency.
- B. A registered pharmacist and licensed physician should be utilized whenever their experience will enhance the learning process of the trainee.
- C. The Staff Development Department in each facility (or staff so designated by the Director of Nursing Service in that facility) shall administer the Medication Administration Educational Program and Examination.

ELIGIBILITY REQUIREMENT:

In order to be eligible to complete the Medication Educational Program and/or administer medications, an employee must be a Registered nurse (RN) or Licensed Practical Nurse (LPN).

CLINICAL COMPETENCE:

- A. Nursing staff members will be prepared through classroom training or the self study guide.
- B. Nursing staff members will demonstrate their acquired knowledge of

clinical competence in medication administration by taking a comprehensive written examination (CWE) and clinical performance evaluation (CPE). The nurse shall demonstrate at least 80% accuracy on each section of the CWE and 100% accuracy on the CPE. Upon successful completion of both the CWE and CPE, records signifying successful completion by the nurse will be kept on file by the department in each facility authorized to do so.

- C. The CWE must be taken and passed by the nurse prior to taking the CPE. Both CWE and CPE may be taken a maximum of two (2) times. A different form of the CWE must be taken when the nurse must take the examination a second time. After the first examination, the CWE shall be retaken for those test units in which the nurse scored less than 80% accuracy. The facility must provide training or retraining to those nurses prior to their retaking a section(s) of the CWE (training or retraining may take the form of individual tutoring or referral to the study packet for additional data).
- D. Adequate security measures shall be developed by the facility to prevent unauthorized access to the CWE.
- E. RNs and LPNs shall NOT be permitted to administer medications without supervision prior to passing both the CWE and CPE.
- F. The process of demonstrating clinical competency shall NOT exceed the facility's identified orientation period.

FUNCTIONS OF THE RN AND LPN:

- A. Authorized functions of the RN and LPN may include the following (the LPN MUST practice under the supervision of an RN):
 1. Administering medications by the oral, topical, rectal, vaginal, intramuscular, subcutaneous, intradermal, and nasal routes to patients/clients under the order of an authorized prescriber.
 2. Delivering individual dose medications to a patient/client for self-administration under the order of an authorized prescriber.
 3. Administering IV fluids and medications via the peripheral vascular route under the order of an authorized prescriber per facility policy.
 4. Recording of doses delivered or administered to the patient/client.
 5. Observing and documenting drug effects and side effects/adverse reactions.
 6. Receiving and writing verbal/telephone orders from an authorized prescriber per facility policy.

NOTE: Administration of IV fluids and medications via central venous route is a Category II procedure for the LPN.

- B. Additional functions of the RN are:
 1. Assessing the effects of administered medications.
 2. Assessing the need for and granting approval for the administration of PRN medication per facility protocol (at a minimum psychotropic

- and controlled substances).
3. Assessing, developing and implementing patient/client medication teaching plans.
 4. Administering IV fluids and medications via central venous routes.

MAINTENANCE OF CLINICAL COMPETENCY:

- A. The RN and LPN shall complete a minimum of five (5) hours of facility approved continuing education in medication administration skills and/or pharmacology every 12 months.
- B. The clinical performance of the RN and LPN must be evaluated annually. The process for evaluation shall be designated by the facility.
- C. Any RN or LPN who separates from DMH/DD/SAS services and/or who has not worked in a nursing position within DMH/DD/SAS for 12 months or longer, will be required to successfully complete the DHHS exam and clinical performance checklist upon rehire.
- D. Continued competency for licensure renewal must be maintained as defined by the North Carolina Board of Nursing.

FAILURE TO MAINTAIN CLINICAL COMPETENCY:

Approval to administer medications may be suspended or revoked for the following reasons:

- A. Less than five (5) hours of documented medication continuing education as described above) in the designated twelve (12) months by the RN or LPN will result in suspension of medication administration approval and disciplinary action (per facility policy).
- B. Unacceptable performance in administering medications will result in immediate suspension of medication/treatment administration privileges. Retraining may be provided in the area of clinical skills as deemed necessary by agency administration. Corrective action and appropriate follow up will be determined by each agency.

QUALITY CONTROL OF MEDICATION ADMINISTRATION EDUCATIONAL PROGRAM:

A medication curriculum committee composed of RN Staff Development instructors from designated facilities or RN staff appointed by the Director of Nursing Service from designated facilities shall review and revise the curriculum and examinations every five (5) years or as needed. Nursing Service Directors and Staff Development personnel will monitor the Medication Administration Program.

INTRODUCTION

OBJECTIVE I: Identify the role and responsibilities of health care personnel in administering medications.

A. Physician/Dentist:

1. May prescribe or administer any legal medication by any route.
2. Responsible for supervising Physician's Extenders (PA's and FNP's).
3. May dispense medications in emergency situations.
4. Must co-sign verbal orders per facility policy (usually within the next working day).
5. Discontinues medications.

B. Physician Extender (PA and FNP):

1. **Physician Assistant (PA):**
 - a. May prescribe medications from a pre-determined list of drugs according to the protocols of each facility.
 - b. Must be supervised by a N.C. licensed physician.
 - c. May administer prescribed medications.
2. **Family Nurse Practitioner (FNP):**
 - a. Must be supervised by a N.C. licensed physician.
 - b. May provide any services written into guidelines submitted by the supervising physician to the N.C. Board of Nursing and approved by the N.C. Board of Nursing.
 - c. May prescribe medications from a predetermined list according to the protocols of each facility.
 - d. May administer prescribed medications.

C. Pharmacist:

1. Compounds, dispenses, packages, and labels medications.
2. Reports potential adverse reactions or side effects to the prescribing physicians and nurses.
3. Maintains and is accountable for the security of medications.
4. Provides patient/client medication information.

D. Registered Nurse:

1. Administers medications which are oral, applied, instilled, inhaled or parenteral, including intravenous fluids and medications via the peripheral vascular route, or central venous route under the order of an authorized prescriber
2. Delivers individual dose medications to a patient for self-administration under the order of an authorized prescriber.
3. Records medication doses delivered or administered to a patient/client.

4. Assesses, monitors, and documents drug effects and side effects/adverse reactions and nursing interventions.
5. Receives or assumes responsibility for writing verbal orders from an authorized prescriber.
6. Assesses the need for and grants approval for the administration of ordered PRN medications (per facility policy).
7. Assesses, develops, and initiates patient/client medication teaching plans.
8. Supervises LPN's in the administration of medications.
9. In accordance with facility policy, may delegate the administration of medications and treatments to the LPN; may delegate treatments such as the application of a medicated shampoo or medicated lotions to unlicensed personnel

E. Licensed Practical Nurse:

1. Must practice under the supervision of a RN.
2. Administers medications which are oral, applied, instilled, inhaled or parenteral, including intravenous fluids and medications via the peripheral vascular route under the order of an authorized prescriber. Administration of IV fluids and medications via the central vascular route is a Category II Activity which requires a written protocol, appropriate training and clinical supervision, and written approval of the agency's nursing administration and medical staff.
3. Delivers individual dose medications to a patient for self-administration under the order of an authorized prescriber.
4. Records medication doses delivered or administered to a patient/individual.
5. Observes, documents, and reports drug effects and side effects/adverse reactions.
6. Receives or assumes responsibility for writing verbal orders from an authorized prescriber (depending on each facility's policy).
7. Administers designated PRN medications with approval of the RN (per facility policy).
8. In accordance with facility policy, may delegate treatments to another LPN; may delegate treatments such as the application of a medicated shampoo or a medicated lotion to unlicensed personnel.

F. Unlicensed Personnel:

1. Administers treatments in identified situations as specified and agreed upon by the Directors of Nursing and Directors of Pharmacy in DMH/DD/SAS facilities.

- a. Examples of treatments that are authorized include identified mouthwashes/rinses, lotions, hair/scalp preparations, powders, creams, soaps, sunscreens, solutions, and antiseptic lozenges.
 - b. Each DMH/DD/SAS facility will have its own written policy to identify specific treatments that can be administered by unlicensed personnel in that facility. The policy should specify under what conditions/criteria medications can be administered by unlicensed personnel.
2. Records medication doses delivered to a patient/individual.
 3. Observes and reports drug effects/side effects/adverse reactions to the supervising RN.

OBJECTIVE II: Define terminology used in the administration of medications.

- A. **Chemotherapy:** the use of drugs/medications in the treatment of disease.
- B. **Contraindication:** Any condition that renders administration of a drug/medication improper or undesirable.
- C. **Dose:** measured portion of a drug/medication to be given at one time.
- D. **Drug/Medication:** a substance or mixture of substances used in the diagnosis, cure, treatment, or prevention of disease; any substance that when taken into the living organism may modify one or more body functions.
- E. **Drug Abuse:** the use of a drug/medication for non-therapeutic effect, especially one for which it was not prescribed or intended.
- F. **Drug Dependence:** a psychological craving for, or physiological reliance on a chemical agent.
- G. **Drug Effect:** the results of drug/medication action.
 1. **Therapeutic:** obtaining the desired effect from a treatment or drug/medication.
 2. **Side Effect:** more than the desired effect caused by the chemicals in the drug/medication which are not usually harmful; related to the action of the drug/medication.
 3. **Adverse Reaction:** a side effect that is so severe that it is harmful to the patient/client (e.g., anaphylaxis).
 4. **Toxic Effect:** a poisonous effect resulting in drug-induced diseases and adverse reactions.

5. **Cumulative Effect:** a buildup of medication; cumulating occurs if the drug is taken and absorbed faster than it is excreted.
 6. **Psychological Effect:** Patient's/client's perceived response to a medication.
- H. **Drug Interactions: the result of drug/drug or food/drug combinations:**
1. **Additive Effect:** response obtained is equal to the sum of the individual parts (e.g., $2 + 2 = 4$).
 2. **Antagonistic Effect:** combined effects are less than the sum of the individual effects (e.g., $2 + 2 = 3$).
 3. **Potential (Synergenistic Effect):** response obtained is greater than the sum of the individual effects (e.g., $2 + 2 = 5$).
- I. **Generic Name:** the official name of a drug/medication and is based on the chemicals found in the drug/medication.
- J. **Habituation:** a psychological and emotional dependence on a drug/medication resulting from the repeated use of the substance.
- K. **Hypersensitivity:** an allergic response to a drug/medication.
- L. **Idiosyncrasy:** an unusual, unexpected reaction to a drug/medication.
- M. **Indication:** sign and/or symptom that let the physician know which drug to select for a specific illness.
- N. **Official Name:** name under which a drug/medication is listed in the United States Pharmacopeia or the National Formulary.
- O. **Pharmacology:** the study or science of drugs/medications, their origin and their effect upon living organisms.
- P. **Pharmacy:** a body of techniques involved in preparing, compounding, and dispensing of drugs/medications for medical use; a place where drugs/medications are compounded and dispensed.
- Q. **Tolerance:** a need for increasingly higher doses of a drug/medication to produce the same effect as the first dose or previous doses.
- R. **Trade Name (brand name):** name given the drug/medication by the manufacturer; patented name.

- S. **Withdrawal Symptoms:** the unpleasant, sometimes life threatening physiological changes that occur when some drugs/medications are discontinued after prolonged, regular use.

OBJECTIVE III: Identify appropriate references from which to obtain medication information.

- A. Physicians Desk Reference (PDR)
- B. Pharmacology Reference Books
- C. Drug package inserts
- D. Facility pharmacist
- E. Facility approved patient/client medication education material.
- F. Reliable on-line resources

OBJECTIVE IV: Identify Federal, State, and Division regulations affecting medication administration practices.

- A. **Federal Controlled Substance Act:** This federal law regulates the manufacture, distribution, and dispensing of narcotics and/or dangerous medications by all persons in the legal chain of procurement. The Drug Enforcement Administration (ED) enforces this act.
- B. **N.C. Controlled Substance Act:** This N.C. law classifies drugs that have abuse potential and states the penalties involved in not adhering to this law, provisions for recordings of drugs, regulations on drug telephone orders, and regulations on refills, etc.
- C. **Federal Food, Drug, and Cosmetic Act:** This federal law prevents the manufacture of adulterated, misbranded, or poisonous foods, drugs, medicines and liquors. This act defines the criteria for testing drugs and the chemical composition of each drug.
- D. **N.C. Food, Drug, and Cosmetic Act:** The N.C. law which acts the same as the Federal law at a state level.
- E. **N.C. Pharmacy Practice Act:** This N.C. law establishes standards by which a pharmacist may practice in N.C. and describes the manner in which prescription and legend drugs are handled.

- F. **N.C. Nurse Practice Act:** This act creates the rules and regulations for those persons who will and do practice professional nursing including administration of medication.
- G. **N.C. Medical Practice Act:** This act creates the rules and regulations for those who will and do practice medicine as a physician.
- H. **Division of Mental Health, Developmental Disabilities, and Substance Abuse Services (DMH/DD/SAS) Standard** relating to the administration of medication.

OBJECTIVE V: Identify commonly used medication administration abbreviations and symbols.

Refer to facility approved abbreviations and symbols.

OBJECTIVE VI: Identify reasons for medication administration and drug/medication examples for each reason.

- A. **Cure infections:** Antibiotics
- B. **Relieve symptoms:** Pain relievers, Antipsychotics
- C. **Aid in diagnosis:** Barium, Tuberculin Skin Test
- D. **Replace secretions:** Insulin, Thyroid Hormones
- E. **Prevent disease:** Vaccines, Vitamins

OBJECTIVE VII: Identify factors which influence medication dosage and response.

- A. **Age**
- B. **Weight**
- C. **Gender**
- D. **Time and route of administration**
- E. **Rate of excretion**
- F. **Genetic factors**
- G. **Drug interactions**

- H. **Condition of the patient/client**
- I. **Pregnant or lactating patient/individual**

OBJECTIVE VIII: Recognize common drug dosage forms.

- A. **Solids**
- B. **Liquids**
- C. **Gases**

OBJECTIVE IX: Contrast effects of drug action.

- A. **Local action:** an effect that takes place at the site of administration.
- B. **Systemic action:** an effect that occurs when the medication enters the bloodstream and travels to the cells.
- C. **Psychological action:** an emotional response to a drug.

OBJECTIVE X: Identify common routes of medication administration.

- A. **Topical:** on top of the skin; usually produces a local effect.
- B. **Instillation:** putting a medication into a body orifice.
- C. **Oral:** by mouth.
- D. **Sublingual:** under the tongue.
- E. **Rectal:** by rectum.
- F. **Inhalation:** inhaled into the lungs.
- G. **Parenteral:** by an injectable route (e.g., intravenous, intramuscular, subcutaneous, intradermal).

UNIT I, SECTION 1: ANTI-INFECTIVES

These drugs are given to control fungal, bacterial, parasitic and viral infections.

A. CLASSIFICATION: SULFONAMIDES

DRUG EXAMPLES:

sulfamethoxazole/trimethoprim (Bactrim®, Septra®)
sulfisoxazole acetyl(Gantrisin®)

INDICATIONS:

These drugs are bacteriostatic and have a broad spectrum antibacterial action. Most commonly used to treat urinary tract infections.

SIDE EFFECTS/ADVERSE REACTIONS:

CNS: Headache, convulsion

BLOOD: Agranulocytosis, aplastic anemia

GI: Nausea, vomiting, diarrhea, abdominal pain, hepatitis

GU: Impaired renal function

SKIN: Skin eruptions, photosensitivity, hypersensitivity

OTHER: Anaphylaxis

NURSING IMPLICATIONS:

ASSESS:

1. Drug allergies including Sulfa Drugs
2. Watch for symptoms of blood dyscrasias (i.e., sore throat, rash, fever, nosebleed, malaise, unusual fatigue, joint pain, pallor, and jaundice).
3. Keep intake and output records.

ADMINISTER:

Oral hypoglycemics such as **tolbutamide (Orinase®)** and **tolazamide (Tolinase®)** should **NOT** be given with this category of anti-infectives.

TEACH:

1. To drink a full glass of water with each dose and to drink plenty of water during the course of treatment to prevent crystalluria. Keep intake and output records.
2. About exposure to direct sunlight and ultraviolet light to prevent a photosensitivity reaction.
3. That oral contraceptives may be unreliable while taking these drugs.

UNIT I, SECTION 1: ANTI-INFECTIVES

B. CLASSIFICATION: ANTI-BACTERIALS

DRUG EXAMPLES:

Penicillins:

amoxicillin/potassium clavulanate (Augmentin®)
amoxicillin trihydrate (Amoxil®)
ampicillin (Amcill®)
ampicillin sodium (Unasyn®)
benzathine benzylpenicillin (Bicillin L-A®)
phenoxymethylpenicillin potassium (Pen Vee K®)
piperacillin sodium (Zosyn®)

Cephalosporins:

cefaclor (Ceclor®)
cefadroxil (Duricef®)
cefazolin sodium (Ancef®)
cefazolin sodium (Kefzol®)
cefotaxime sodium (Claforan®)
cefoxitin sodium (Mefoxin®)
ceftriaxone sodium (Rocephin®)
cephalexin monohydrate (Keflex®)
cefuroxime (Ceftin®)

Tetracyclines:

doxycycline hydrate (Vibramycin®)
tetracycline hydrochloride (Sumycin®, Achromycin®)

Fluoroquinolones:

ciprofloxacin (Cipro®)
levofloxacin (levaquin®)
ofloxacin (Floxin®)

Aminoglycosides:

amikacin sulfate (Amikin®)
gentamicin sulfate (Garamycin®)
streptomycin sulfate
tobramycin sulfate (Nebcin®)

Miscellaneous:

azithromycin (Zithromax®)
clarithromycin (Biaxin®)
clindamycin phosphate (Cleocin®)

erythromycin estolate, erythromycin ethysuccinate (Ilosone®, Erythromycine®, Erythrocin®)
Nitrofurantoin macrocrystals (Macrobid®, Macrochantin®)
pentamidine (Pentam®)
vancomycin (Vancomycin®)

INDICATIONS:

These drugs are highly effective against infections caused by bacteria. Some are narrow spectrum and some are broad spectrum.

SIDE EFFECTS/ADVERSE REACTIONS:

CNS: Headache, dizziness, **ciprofloxacin (Cipro®)** may cause seizures
BLOOD: Blood dyscrasias
EENT: Ototoxicity (Aminoglycosides)
GI: Nausea, vomiting, diarrhea, abdominal cramps, anorexia, **clindamycin phosphate (Cleocin®)** and **erythromycin estolate (Ilosone®)** may cause bloody or tarry stools
GU: Vaginal moniliasis, kidney damage, anuria, renal toxicity (**Aminoglycosides**)
HYPERS: Wheezing, anaphylaxis, skin rash or eruptions
SKIN: Urticaria, pruritus, rash - maculopapular
OTHER: Thrush, pain at the injection site, overgrowth of non-susceptible organisms

NURSING IMPLICATIONS:

ASSESS:

1. Use cautiously with patients/individuals who have drug allergies.
2. **Penicillin:** For allergic reaction to penicillin. If allergic to one penicillin, should be considered allergic to all penicillins and may be allergic to **cephalosporins**. If questions arise, skin testing may be ordered prior to administration of penicillin.
3. Cultures and sensitivity tests and lab work done before medications started, as ordered by the medical provider.
4. For signs of superinfections such as vaginal or oral yeast infections.
5. **ciprofloxacin (Cipro®):** Monitor for seizures.
6. **Aminoglycosides:**
 - a. Monitor intake and output and notify medical provider if output decreases.
 - b. Those on long term therapy should have their hearing checked before and during therapy.
 - c. Peak and trough levels as ordered by the medical provider.
 - d. Renal function tests as ordered by the medical provider.

ADMINISTER:

1. Check the specific drug to determine whether or not it should be given with food. Food inhibits the absorption of many antibiotics so most are given 1 hour before or 2-3 hours after meals.
2. Each dose should be taken on time to maintain adequate blood levels.
3. Observe for 30 minutes following administration of a parenteral drug for signs of an allergic reaction.
4. **Penicillins: DO NOT** massage the site after injecting long-acting penicillins. **DO NOT** give oral penicillins with acidic fruit juices such as orange juice.
5. **Probenecid** increases the blood levels of penicillins and cephalosporins and may be given for that reason.

TEACH:

1. Large doses may cause yeast infections.
2. To take the entire quantity of medication as prescribed and to never share unused or outdated medication.
3. Those on **Tetracycline:**
 - a. to avoid sunlight or to wear sunscreen when outside.
 - b. that absorption of the medication is inhibited by iron, aluminum, calcium, and magnesium; not to take with antacids, dairy products, or other foods high in calcium.
 - c. to use these drugs cautiously during the last half of their pregnancy and by children under 8 years of age because can cause permanent tooth discoloration, enamel defects and retardation of bone growth.
4. Those on **Aminoglycosides:** to drink fluids and monitor intake and output.

UNIT I, SECTION 1: ANTIINFECTIVES

C. CLASSIFICATION: ANTIFUNGALS

DRUG EXAMPLES:

amphotericin B desoxycholate (Fungizone®)
clotrimazole (Mycelex®, Lotrimin®)
fluconazole (Diflucan®)
griseofulvin (Fulvicin®)
ketoconazole (Nizoral®)
metronidazole (Flagyl®)
miconazole (Monistat®)
nystatin (Mycostatin®)
terbinafine hydrochloride (Lamisil®)
tolnaftate (Tinactin®)

INDICATIONS:

These drugs are effective against fungal infections

SIDE EFFECTS/ADVERSE REACTIONS:

CNS: Headache
GI: Nausea, vomiting, anorexia, diarrhea
GU: Vulvovaginal burning, itching
HEMAT: Blood dyscrasias
SKIN: Rash, urticaria, fever

NURSING IMPLICATIONS:

ASSESS:

1. Intake/output and vital signs.
2. For symptoms of agranulocytosis (e.g., nosebleed, fever, rash).

ADMINISTER:

1. Provide oral hygiene before use of **liquid nystatin (Mycostatin®)**.
2. Give these drugs with meals to prevent/lessen GI distress.
3. **griseofulvin (Fulvicin®)**: Insure adequate fat in diets; helps absorption.

TEACH:

1. That treatment may be prolonged but is needed to control the infection and prevent relapse.
2. Predisposing factors for vaginal infections (e.g., tight fitting pantyhose; use of antibiotics, birth control pills, corticosteroids; diabetes).
3. **NOT** to consume alcohol because it may cause a hypertensive crisis and/or GI reaction.
4. To treat all sex partners.

UNIT I, SECTION 1: ANTI-INFECTIVES

D. CLASSIFICATION: ANTI-MYCOBACTERIALS

DRUG EXAMPLES:

ethambutol hydrochloride (Myambutol®)
isoniazid (INH®)
pyrazinamide (PZA®)
rifampin (Rifadin®)
streptomycin sulfate

INDICATIONS:

These drugs are used to treat tuberculosis.

isoniazid (INH®) may be used for prophylaxis.

SIDE EFFECTS/ADVERSE REACTIONS

CNS: Drowsiness, psychotic symptoms, convulsions, damage to the 8th cranial nerve (**streptomycin sulfate**)

EENT: Tinnitus, hearing loss (**streptomycin sulfate**), vision and color discrimination loss (**ethambutol hydrochloride [Myambutol®]**)

GI: Nausea, vomiting, abdominal pain

GU: Nephrotoxicity

HEPAT: Jaundice, hepatitis

NURSING IMPLICATIONS:

ASSESS:

1. **ethambutol hydrochloride (Myambutol®):** for vision changes.
2. **streptomycin sulfate:** for hearing loss.

ADMINISTER:

Give **isoniazid (INH®)** with meals.

TEACH:

1. That drinking alcohol with these drugs may increase the incidence of hepatotoxicity.
2. Importance of complying with treatment regimen which may take months to years.
3. **isoniazid (INH®):** Use with Carbamazepine (Tegretol®) may cause hepatotoxicity. To notify the medical provider immediately if symptoms of liver impairment occur (decreased appetite, malaise, jaundice, dark urine.)

4. **streptomycin sulfate:** to drink plenty of fluids; to report tinnitus (ringing in the ears), fullness in the ear or roaring sounds; to have hearing tests done at regular intervals.
5. **ethambutol hydrochloride (Myambutol®):** to have eye tests performed before and during therapy and monitor for signs of gout (e.g., pain in toes).

UNIT I, SECTION 1: ANTI-INFECTIVES

E. CLASSIFICATION: ANTI-PARASITIC DRUGS

DRUG EXAMPLES:

lindane (Kwell Shampoo/lotion®)
mebendazole (Vermox®)
metronidazole (Flagyl®)
pyrantel pamoate (Antiminth®, Combantrin®)

INDICATIONS:

These drugs are used to eradicate various helminths including tapeworms, pinworms, hookworms, roundworms, and schistosomes.

metronidazole (Flagyl®) is used to treat amebic hepatic abscesses, intestinal amebiasis and trichomoniasis.

lindane (Kwell®) is used to treat pediculosis and scabies.

SIDE EFFECTS/ADVERSE REACTIONS:

CNS: Headache, mood changes, seizures, dizziness/vertigo, drowsiness

GI: Nausea, vomiting, diarrhea, abdominal cramps, anorexia

SKIN: Pruritis, dermatitis

OTHER: Metallic taste (**metronidazole [Flagyl®]**)

NURSING IMPLICATIONS:

ASSESS:

1. Intake and output.
2. Odor and consistency of stools.

ADMINISTER:

1. **metronidazole (Flagyl®)** should be given with meals.
2. **lindane (Quell®) lotion** should be washed off after 12 hours. Wait one week before a second application. **NEVER** use it more than twice in a week to prevent toxicity.
3. **lindane (Kwell®) shampoo:** apply undiluted to affected area and work into a lather for 4-5 minutes. Small amounts of water may enhance formation of lather. Apply 30 ml of shampoo for short hair, 45 ml for medium length hair, and 60 ml for long hair. Rinse thoroughly and rub dry with a towel.

TEACH:

1. To avoid reinfestation, wash perineal area daily and change undergarments and bedclothes daily; to wash hands and clean fingernails after a bowel movement and before meals.
2. **metronidazole (Flagyl®):** to **AVOID** drinking alcoholic beverages or medications containing alcohol.

UNIT I, SECTION 1: ANTI-INFECTIVES

F. CLASSIFICATION: ANTI-VIRALS

DRUG EXAMPLES:

acyclovir sodium (Zovirax®)
amantadine hydrochloride (Symmetrel®)
famciclovir (Famivir®)
ganciclovir (Cytovene®)
lamivudine (Epivir®)
lamivudine and zidovudine (Combivir®)
oseltamivir phosphate (Tamiflu®)
zidovudine (Retrovir®, formerly azidothymidine or AZT)

INDICATIONS:

acyclovir (Zovirax®) is used to treat retinitis resulting from complications of AIDS, Herpes Simplex Types 1 and 2, and Varicella-zoster.

amantadine (Symmetrel®) is used to treat flu-like symptoms.

zidovudine (Retrovir®) inhibits vitro replication of Retroviruses including HIV and HTLV-1.

ganciclovir (Cytovene®) is used to treat cytomegalovirus (CMV) Retinitis in immunocompromised persons.

famciclovir (Famvir®) is used to treat acute Herpes Zoster and Genital Herpes.

SIDE EFFECTS/ADVERSE REACTIONS:

CNS: Dizziness, tremors, ataxia; irritability, insomnia, confusion, depression (**amantadine hydrochloride [Symmetrel®]**)

CV: Hypotension (**amantadine hydrochloride [Symmetrel®]**)

GI: Anorexia, nausea, vomiting, diarrhea

GU: Decreased urination (**acyclovir [Zovirax®]**), hematuria (**ganciclovir [Cytovene®]**)

HEMAT: Anemia (**ganciclovir [Cytovene®]**), agranulocytosis and increased bleeding (**zidovudine [Retrovir®]**)

SKIN: Rash and urticaria (**acyclovir [Zovirax®]**); mottling, dermatitis and photosensitivity (**amantadine hydrochloride [Symmetrel®]**)

NURSING IMPLICATIONS:

ASSESS:

acyclovir sodium (Zovirax®), amantadine HCl (Symmetrel®), and famciclovir (Famivir®): Intake and output and for allergies and skin reactions.

ADMINISTER:

1. **acyclovir sodium (Zovirax®):** lower doses are used with patients/clients who have renal failure.
2. **zidovudine (Retrovir®):** capsules should be swallowed whole and **NOT** be given to patients/individuals with renal or hepatic impairment.
3. Give cautiously to patients/individuals with a history of seizures, MI, or other underlying neurological disorders.

TEACH:

1. That these drugs are not cures and do **NOT** prevent spread of infection to others.
2. **zidovudine (Retrovir®):** to report sore throat, swollen lymph nodes, malaise, and fever; to take at regular intervals around the clock; to check before taking over-the-counter (OTC) drugs.
3. **ganciclovir (Cytovene®):** to use contraception during treatment.

UNIT I, SECTION 2: ANTI-INFLAMMATORY DRUGS

A. CLASSIFICATION: NON-STEROIDALS

DRUG EXAMPLES:

Celecoxib (Celebrex®)
diclofenac sodium (Voltaren®)
ibuprofen (Motrin®, Advil®, Nuprin®)
indomethacin (Indocin®)
ketoprofen (Orudis®)
ketorolac tromethamine (Toradol®)
meloxicam (Mobic®)
naproxen (Aleve®, Naprosyn®)
piroxicam (Feldene®)
sulindac (Clinoril®)

INDICATIONS:

These drugs are used to treat inflammation in rheumatoid arthritis, osteoarthritis, bursitis, superficial venous thrombosis, mild to moderate pain, primary dysmenorrhea, gout, and postextraction dental pain.

SIDE EFFECTS/ADVERSE REACTIONS:

BLOOD: Prolonged bleeding time, anemia
CNS: Anxiety, depression, drowsiness, insomnia, amnesia, irritability, headache
CV: CHF, hypertension, peripheral edema
EENT: Tinnitus, swelling of lips and tongue, rhinitis
GI: Abdominal pain, cramps, constipation, diarrhea, nausea, indigestion, GI bleeding, peptic ulceration, anorexia
GU: Fluid retention, renal failure
HEPAT: Hepatitis, jaundice, elevated liver enzymes
METAB: Hyponatremia, hyperkalemia, hypoglycemia
RESP: Asthma
SKIN: Rash, pruritis, urticaria
OTHER: Anaphylaxis, weight changes

NURSING IMPLICATIONS:

ASSESS:

1. For signs of GI bleeding (e.g., coffee ground looking vomit, dark tarry stools); increased BP and fluid retention
2. **indomethacin (Indocin®):** for signs of toxicity (e.g., eye problems, blurred vision, or ringing in the ears).
3. For the following drug interactions:
 - a. **Anticoagulants:** possible increased incidence of bleeding; monitor closely.

- b. **Aspirin:** concomitant use is **NOT** generally recommended; may mask signs of infection.
- c. **Antihypertensives:** reduced effect.
- d. **Lithium:** altered plasma levels.

ADMINISTER:

- 1. Administer oral doses with food to avoid gastric irritation.
- 2. **DO NOT** crush enteric coated tablets.

TEACH:

- 1. To take oral doses with food.
- 2. To report signs and symptoms of GI bleeding and hepatotoxicity to the medical provider immediately.
- 3. **indomethacin (Indocin®):** to avoid alcohol and salicylates; may cause bleeding.
- 4. Renal and hepatic functioning should be monitored frequently.

UNIT I, SECTION 2: ANTI-INFLAMMATORY DRUGS

B. CLASSIFICATION: CORTICOSTEROIDS

DRUG EXAMPLES:

beclomethasone dipropionate (Beconase®)
betamethasone (Diprolene®)
budesonide (Pulmicort Respules®)
cortisone acetate (Cortone®)
dexamethasone sodium (Decadron®)
hydrocortisone (Cortef®)
hydrocortisone acetate (Anusol-HC®)
methylprednisolone (Medrol®)
methylprednisolone sodium succinate (Solu-Medrol®)
prednisone (Orasone®)
triamcinolone (Aristocort®, Kenacort®, Kenalog®)

INDICATIONS:

These drugs have an anti-inflammatory effect and are effective in treating asthma, autoimmune disorders, immunosuppression, allergic, and anaphylactic reactions.

SIDE EFFECTS/ADVERSE REACTIONS:

CNS: Euphoria, insomnia, psychotic behavior, pseudotumor cerebri
CV: CHF, hypertension, edema
EENT: Hoarseness, fungal infections of mouth and throat, throat irritation, cataracts, glaucoma
GI: Dry mouth, peptic ulcer, GI irritation, increased appetite
LOCAL: Atrophy at IM injection site
METAB: Possible hypokalemia, hyperglycemia, carbohydrate intolerance, growth suppression in children
OTHER: Muscle weakness, pancreatitis, hirsutism, withdrawal symptoms (rebound inflammation), fatigue, weakness, dizziness, depression, orthostatic hypotension, hypoglycemia, Cushingoid appearance (e.g., Buffalo hump and moonface)

NURSING IMPLICATIONS:

ASSESS:

1. These drugs often mask the severity of illnesses.
2. Monitor serum electrolytes, blood pressure and blood sugar during therapy.
3. Weight before therapy begins.
4. For signs of depression and/or psychosis.
5. Immunizations may show decreased antibody response.
6. For the following drug interactions with **Corticosteroids**:
 - a. **Barbiturates, phenytoin (Dilantin®), rifampin (Rifadin®):**

- decreased corticosteroid effect.
- b. **indomethacin (Indocin®), aspirin:** increased risk of bleeding and GI distress. Give together cautiously.

ADMINISTER:

Oral doses with food when possible to avoid gastric irritation.

TEACH:

1. That **SUDDEN WITHDRAWAL FROM THESE DRUGS MAY BE FATAL:** Glucocorticoid therapy should be tapered slowly. **CAUTION NOT** to discontinue drug therapy abruptly.
2. Warn patients/clients with arthritis **NOT** to overuse the affected joint while taking these medications in order to avoid permanent joint damage.
3. When using topical preparations, to read directions regarding use of dressings.
4. Unless contraindicated, to eat foods high in potassium and low in sodium.
5. To take oral medications with food.
6. To rinse the mouth after using inhaled corticosteroid medications such as **budesonide (Pulmicort Respules®)** to prevent an oral yeast infection.

UNIT I, SECTION 3: AUTONOMIC DRUGS

A. CLASSIFICATION: ANTIPARKINSON DRUGS

DRUG EXAMPLE:

amantadine hydrochloride (Symmetrel®)
benztropine mesylate (Cogentin®, Sinemet®)
bromocriptine mesylate (Parlodel®, Dopamine Receptor Agonist)
diphenhydramine hydrochloride (Benadryl®)
levodopa (Larodopa®)
pramipexole dihydrochloride (Mirapex®)
procyclidine hydrochloride (Kemadrin®)
ropinirole hydrochloride (Requip®)
selegiline hydrochloride (Eldepryl®)
trihexyphenidyl hydrochloride (Artane®)

INDICATIONS:

These drugs are used to treat Parkinson disease and extrapyramidal reactions associated with the use of Antipsychotics such as drooling, thick tongue, slurred speech and abnormal movements.

SIDE EFFECTS/ADVERSE REACTIONS:

CNS: Nervousness, dizziness, headaches, psychotic symptoms (e.g. hallucinations, delusions, amnesia), restlessness, may increase sensitivity to tardive dyskinesia (TD)
CV: Tachycardia, hypotension
GI: Dry mouth, nausea, constipation
GU: Urinary hesitancy or retention
OTHER: Lack of sweat; abnormal deficiency of sweat

NURSING IMPLICATIONS:

ASSESS:

1. For problems with voiding and constipation.
2. **benztropine mesylate (Cogentin®)** and **trihexyphenidyl hydrochloride (Artane®)** may be abused so monitor for signs of abuse (e.g., asking for more frequently than ordered, simulating EPS {extrapyramidal} symptoms).
3. Monitor diabetics taking **benztropine mesylate (Cogentin®)** or **trihexyphenidyl hydrochloride (Artane®)** liquid because they contain sugar.
4. When administering with an Antipsychotic, monitor closely for anticholinergic symptoms (e.g. urinary retention, dry mouth).
5. For problems with decreased sweating during hot weather because may lead to hyperthermia.

ADMINISTER:

Administer **benztropine mesylate (Cogentin®)** after meals to help decrease GI distress.

TEACH:

1. Never discontinue these drugs abruptly, decrease slowly.
2. Limit activities during hot weather because decreased sweat may lead to hyperthermia.
3. To report problems with urinary hesitancy or retention.

UNIT I, SECTION 3: AUTONOMIC DRUGS

B. CLASSIFICATION: SKELETAL MUSCLE RELAXANTS

DRUG EXAMPLES:

atracurium beylate (Tracrium®)
baclofen (Lioresal®)
chlorzoxazone (Parafon Forte DSC®, Paraflex®)
cyclobenzaprine (Flexeril®)
dantrolene sodium (Dantrium®)
*diazepam (Valium®)
methocarbamol (Robaxin®)
succinylcholine chloride (Anectine®)
tizanidine hydrochloride (Zanaflex®)

INDICATIONS:

These drugs are used to treat painful musculoskeletal disorders (i.e., back injuries). Some are used to treat spasticity.

dantrolene sodium (Dantrium®) and other drugs in this classification may be used to treat spasticity of multiple sclerosis and cerebral palsy.

succinylcholine chloride (Anectine®) is used as an adjunct to anesthesia and with ECT.

SIDE EFFECTS/ADVERSE REACTIONS:

CNS: Drowsiness, insomnia, dizziness, muscle incoordination
CV: Decreased blood pressure, tachycardia, bradycardia
GI: GI upset, dry mouth
GU: Urine color changes with Chlorzoxazone (Paraflex®)
HEPAT: Increased liver enzymes (Zanaflex®)
RESP: Decreased respirations

NURSING IMPLICATIONS:

ASSESS:

1. Individuals with epilepsy, who are taking **dantrolene sodium (Dantrium®)** or **baclofen (Lioresal®)** for increased incidence of seizures.
2. Monitor the patient/individuals vital signs.

ADMINISTER:

1. Give these drugs with meals or milk to reduce irritation.
2. **succinylcholine chloride (Anectine®)** is given only under the direct supervision of a medical provider. Vital signs should be monitored every 5-10 minutes during infusion and emergency equipment should be readily available.

TEACH:

1. Warn patients/clients to avoid activities which require alertness.

2. **DO NOT** withdraw **baclofen (Lioresal®)** abruptly unless required for severe adverse reactions because it may precipitate hallucinations.

*See section on Antianxiety Drugs, Benzodiazepines for information on **diazepam (Valium®)**.

UNIT I, SECTION 4: BLOOD FORMATION, COAGULATION, AND THROMBOSIS

A. CLASSIFICATION: ANTICOAGULANTS

DRUG EXAMPLES:

Antianginal Nitrates:

Clopidogrel bisulfate (Plavix®)
enoxaparin sodium (Lovenox®)
heparin sodium (Calcilean®, Hepalean®)
warfarin sodium (Coumadin®)

INDICATIONS:

These drugs are given to patients/individuals at risk of developing a blood clot (thrombosis). They **DO NOT** dissolve previously formed clots but do forestall their enlargement and prevent new clots from forming. **Warfarin sodium (Coumadin®)** is the anticoagulant of choice for patients/individuals on antacids or **phenytoin (Dilantin®)**.

SIDE EFFECTS/ADVERSE REACTIONS:

BLOOD: Hemorrhage with excessive dosage, leuk openia, prolonged clotting time, thrombocytopenia

GI: Paralytic ileus (**warfarin sodium [Coumadin®]**)

GU: Hematuria

LOCAL: Irritation, mild pain

Other: "White Clot Syndrome": hypersensitivity reactions including: chills, fever, pruritis, rhinitis, burning feet, conjunctivitis, tearing, arthralgia, urticaria (**heparin sodium [Hepalean®]**).

NURSING IMPLICATIONS:

ASSESS:

1. Blood studies: Hematocrit, blood in stools, platelet count.
2. Prothrombin time, INR.
3. For bruises, bleeding gums, tarry stools, nosebleeds, petechiae; blood in urine may be first sign of hemorrhage.
4. For fever, rash, itching.

ADMINISTER:

1. **warfarin sodium (Coumadin®):** Should be given at the same time each day. May be given in divided doses to decrease GI irritation.
2. **IV:** dilute and administer according to directions.
3. **SC heparin sodium:** give between iliac crests in lower abdomen deep into subcutaneous fat; leave needle in place for 10 seconds after injecting the Heparin Sodium; then withdraw the needle. Rotate sites every 12 hours. **DO NOT MASSAGE AREA OR ASPIRATE.** Watch for signs of bleeding at injection site.

4. **enoxaparin sodium (Lovenox®)** injection technique: give in stomach area (right or left side) at least 2 inches from the navel. Pinch 1 inch of subcutaneous fat and inject needle at a 90 degree angle into skin fold (hold the skin fold throughout the injection). **DO NOT** aspirate or massage the site.
5. Avoid all IM injections that may cause bleeding.

EVALUATE:

For therapeutic effect: decrease in thrombosis.

TEACH:

1. Avoid over-the-counter (OTC) medications unless ordered by the medical provider.
2. Notify medical provider if menses is heavier than usual; may require dosage adjustment.
3. Notify the medical provider immediately if fever and rash develop.
4. Eat consistent amounts of leafy green vegetables which contain Vitamin K because eating different amounts of different vegetables may alter anticoagulant effect.
5. Use soft bristle toothbrush and electric razor for shaving.
6. Avoid contact sports.
7. Avoid IM injections if possible.
8. Wear a Medi-Alert bracelet or carry a card at all times.
9. Signs of bleeding and what to report to RN/medical provider.
10. That smoking increases dose requirement for **warfarin sodium (Coumadin®)**.

UNIT I, SECTION 4: BLOOD FORMATION, COAGULATION, AND THROMBOSIS
B. CLASSIFICATION: COAGULANTS (HEPARIN AND WARFARIN ANTAGONISTS)

DRUG EXAMPLE:

protamine sulfate (Heparin antagonist)
phytonadione (Vitamin K®) (Warfarin antagonist)

INDICATIONS:

These drugs are used to treat Heparin Calcium, Heparin Sodium or Warfarin overdose, hemorrhage, and capillary bleeding.

SIDE EFFECTS/ADVERSE REACTIONS:

CV: Fall in blood pressure, bradycardia
GI: Nausea and vomiting
RESP: Dyspnea
OTHER: Transitory flushing, feeling of warmth

NURSING IMPLICATIONS:

ASSESS:

1. Vital signs frequently.
2. For spontaneous bleeding particularly with those who have had recent cardiac surgery, are on dialysis, or are receiving increased doses of anticoagulants.
3. For allergies to fish.

ADMINISTER:

Have emergency equipment readily available to treat shock.

EVALUATE:

Therapeutic response: Reverse of Heparin overdose.

TEACH:

1. Reasons for taking drug.
2. To report symptoms of bleeding such as dark, tarry stools, bruising to RN/medical provider.

UNIT I, SECTION 4: BLOOD FORMATION, COAGULATION, AND THROMBOSIS

C. CLASSIFICATION: ANTIANEMIAS (HEMATINICS)

DRUG EXAMPLES:

- ferrous gluconate (Fergon®)
- ferrous sulfate (Feosol®, Fer-In-Sol®)
- iron dextran (Imferon®)

INDICATIONS:

These drugs are used to treat iron deficiencies which may result from blood loss, drug therapy or inadequate intake of iron.

SIDE EFFECTS/ADVERSE REACTIONS:

- CNS:** Headache, transitory paresthesis, arthralgia, dizziness, malaise, syncope
(iron dextran [Imferon®])
- CV:** Hypotensive reaction, flushing with rapid IV administration, tachycardia(iron dextran [Imferon®])
- GI:** Nausea, vomiting, constipation, black tarry stools; metallic taste (iron dextran [Imferon®])
- LOCAL:** Irritation or phlebitis at injection site (iron dextran [Imferon®])
- OTHER:** Elixir may stain teeth, anaphylaxis

NURSING IMPLICATIONS:

ASSESS:

1. Toxicity: nausea, vomiting, diarrhea (green and then black tarry), pallor, cyanosis, shock, coma.
2. Cause of iron deficiency (e.g. anemia, drugs, diet).

ADMINISTER:

1. Dilute liquid preparations in juice (preferably orange juice). **DO NOT** administer with milk or antacids.
2. Give liquid preparations through a straw to avoid staining teeth.
3. Give oral tablets with orange juice to promote absorption.
4. **Iron dextran (Imferon®):** Test dose is required before administration. Give IM using the Z track method.

EVALUATE:

Therapeutic response: improvement in hematocrit, hemoglobin, reticulocytes, decreased fatigue and weakness.

TEACH:

1. That stools will turn dark green or black and have a "tarry" look.
2. That iron poisoning may occur if dose is exceeded.

3. Check for bleeding.
4. Foods to eat to decrease constipation (e.g. fresh fruits and vegetables, cereals).
5. **ferrous gluconate (Fergon®)/ferrous sulfate (Feosol®):**
 - a. **NOT** to crush tablets; to swallow whole.
 - b. Drink liquid through a straw to avoid staining teeth.
 - c. **NOT** to take with milk products.
 - d. Stay upright for 30 minutes after taking medication to prevent esophageal corrosion.
 - e. **NOT** to substitute one iron salt for another (each contains different strengths of iron).
 - f. Keep out of reach of children (3-4 tablets can cause serious iron poisoning).
6. **iron dextran (Imferon®):**
 - a. Delayed reaction may occur 1-2 days after administration and last for several days.
 - b. Report to RN/medical provider: fever, tiredness, joint aches, nausea, vomiting, backache.

UNIT I, SECTION 4: BLOOD FORMATION, COAGULATION, AND THROMBOSIS

D. CLASSIFICATION: THROMBOLYTIC AGENTS

DRUG EXAMPLES:

ANTITHROMBOLYTIC:

alteplase (rtPA, Activase®)
pentovifylline (Trental®)

THROMBOLYTIC ENZYMES:

anistreplase (Eminase®)
streptokinase (Streptase®)
urokinase (Abbokinase®)

INDICATIONS:

These drugs are used to dissolve unwanted thrombi in the blood. All may be used in the treatment of acute myocardial infarction. **alteplase (rtPA)**, **streptokinase (Streptase®)**, and **urokinase (Abbokinase®)** are used in treating pulmonary embolism. **urokinase (Abbokinase®)** is used in dissolving IV cannula occlusions. **streptokinase (Streptase®)** is used in dissolving deep venous thrombi and arteriovenous (AV) cannula occlusions.

SIDE EFFECTS/ADVERSE REACTIONS:

BLOOD: Severe, spontaneous bleeding
CNS: Fever, cerebral hemorrhage
CV: Hypotension, arrhythmias, edema
GI: Nausea, vomiting
RESP: Bronchospasms
OTHER: Bleeding at puncture sites, hypersensitivity reactions, urticaria, arthralgias

**CONTRAINDICATIONS:

Streptokinase (Streptase®) is a Streptomycin derivative and should **NOT** be used for patients/individuals who have:

1. Had a recent strep infection.
2. Recently been treated with streptomycin derivatives.
3. Been previously administered **streptokinase (Streptase®)**.

**There are many more contraindications than those listed above. Check before administering.

NURSING IMPLICATIONS:

ASSESS:

1. For bleeding:
 - a. During first hour of treatment (hematuria, bleeding from mucous membranes, bruising, all body fluids, stools).
 - b. Check vascular access site frequently for bleeding.
 - c. Use pressure for 30 seconds for minor bleeding.
2. Blood pressure, pulse, respirations, and temperature.
3. Allergic reaction: fever, rash, chills, itching.
4. Blood studies (PT and PTT levels).
5. **streptokinase (Streptase®) and urokinase (Abbokinase®):**
 - a. Neurologic changes that may indicate intracranial bleeding.
 - b. Retroperitoneal bleeding: back pain, leg weakness, diminished pulse.

ADMINISTER:

1. As soon as possible after thrombi/coronary occlusion for best results.
2. Avoid unnecessary physical handling of the patient/client. Place sign at head of bed of any patient/individual who has received thrombolytics to notify all staff. An example of such a sign is shown below:

CAUTION!
ACTIVASE (rtPA) PATIENT
BLEEDING PRECAUTIONS IN EFFECT
NO VENIPUNCTURES
AVOID UNNECESSARY PHYSICAL HANDLING
PHYSICIAN: _____

EVALUATE:

Therapeutic response: absence of or resolution of thrombi, improved ventricular function, resolution of embolism.

TEACH:

1. Purpose and expected results of therapy.
2. To be gentle when touching the patient/client.

UNIT I, SECTION 5: **CARDIOVASCULAR SYSTEM DRUGS**

A. CLASSIFICATION: CARDIAC GLYCOSIDES

DRUG EXAMPLES:

- digitoxin (Crystodigin®)
- digoxin (Lanoxin®)

INDICATIONS:

These drugs increase cardiac output by slowing and strengthening the heart beat. They are utilized in the treatment of congestive heart failure, paroxysmal supraventricular tachycardia and atrial fibrillation and flutter.

SIDE EFFECTS/ADVERSE REACTIONS:

- CNS:** Fatigue, generalized muscle weakness, agitation, hallucinations, dizziness, vertigo, stupor, headache
- CV:** Increased severity of congestive heart failure, arrhythmias, hypotension, slowed pulse
- EENT:** Yellow-green halos around visual images, blurred vision, light flashes, photophobia, double vision
- GI:** Anorexia, nausea, vomiting, diarrhea

NURSING IMPLICATIONS:

ASSESS:

1. Apical pulse for 1 minute before giving; if below 60 withhold and notify the medical provider.
2. Symptoms of toxicity (e.g., nausea, vomiting, yellow-green halo around visual images, excessive slowing of pulse).
3. Monitor weight regularly.
4. Apical pulse, character, rate, rhythm to assess cardiac functioning.

ADMINISTER:

1. IM injections are poorly absorbed and very painful.
2. Usually given at higher "loading" or "digitalizing" dose at first and reduced when therapeutic effects achieved or undesirable effects occur. Digitalization usually occurs within days with PO medication and more rapidly with IV.

EVALUATE:

Therapeutic effects: decreased weight, edema, pulse, respirations, and increased urine output.

TEACH:

1. **NOT** to stop drug abruptly

2. Signs and symptoms of digitalis toxicity (e.g., nausea and/or vomiting, diarrhea, seeing halos, pulse below 60).
3. To keep tablets in light resistant containers.
4. To eat foods high in potassium (e.g., bananas, potatoes, citrus fruits, tomatoes, dates, apricots).

UNIT I, SECTION 5: **CARDIOVASCULAR SYSTEM DRUGS**

B. CLASSIFICATION: ANTIARRHYTHMIC DRUGS

DRUG EXAMPLES:

Antianginal Beta Blockers:

propranolol hydrochloride (Inderal®)

Anticholinergic Parasympatholytics:

atropine sulfate (Sal-Tropine®)

Anticonvulsant Antidysrhythmic:

phenytoin (Dilantin®)

Antidysrhythmics:

adenosine (Adenocard®)

bretylum tosylate (Bretylol®)

disopyramide (Norpace®)

lidocaine hydrochloride (Xylocaine®)

procainamide hydrochloride (Pronestyl®)

quinidine gluconate (CinQuin®, Quinidine Sulfate®)

INDICATIONS:

These drugs are used to prevent and treat atrial and ventricular arrhythmias, including those secondary to a myocardial infarction.

Propranolol hydrochloride (Inderal®) may be ordered for treatment of aggression and tremors associated with Lithium.

SIDE EFFECTS/ADVERSE REACTIONS:

CNS: Dizziness, agitation, depression, fatigue, muscle weakness, syncope, tremors, delirium, insomnia

CV: Hypotension, congestive heart failure, heart block, slow heart rate, angina

EENT: Blurred vision, dry eyes, dry nose

GI: Constipation, dry mouth, nausea, vomiting, anorexia, bloating, abdominal pain

GU: Urinary retention and hesitancy

HEPAT: Cholestatic jaundice

METAB: Hypoglycemia

SKIN: Rashes, flushed dry skin, cold extremities (Beta Blocker)

NURSING IMPLICATIONS:

ASSESS:

1. Apical pulse for 1 minute, if below 60, hold and notify the medical provider.

2. Baseline pulse, report changes in rate, rhythm, and quality.
3. Blood pressure: check for hypo- and hypertension.
4. Serum electrolytes, particularly potassium (K).
5. Diabetics for hypoglycemia.
6. Urinary hesitancy, frequency, or change in input and output ratio.
7. Dry mouth: sugarless sour balls or chewing sugarless gum helps.
8. Numbness or muscle twitching for those on Lidocaine hydrochloride.

ADMINISTER:

1. **DO NOT** combine these drugs with alcohol.
2. **DO NOT** crush or break sustained suspension capsules.
3. Give Propranolol (Inderal®) with meals to increase absorption.

EVALUATE:

Therapeutic response: decreased dysrhythmias.

TEACH:

1. To take exactly as ordered; if dose missed, **DO NOT** double up.
2. To avoid alcohol because it may cause serious hypotension.
3. To avoid rapid position changes to prevent orthostatic hypotension.
4. To avoid hazardous activities if blurred vision or dizziness occurs.
5. To **NOT** discontinue these drugs abruptly.

UNIT I, SECTION 5: **CARDIOVASCULAR SYSTEM DRUGS**

C. CLASSIFICATION: DIURETICS

DRUG EXAMPLES:

Aldosterone Antagonist:

spironolactone (Aldactone®)

Pteridine Derivative (Potassium Sparing):

triamterene/HCTZ (Dyazide®, Maxzide®)

Sulfonamide Derivative:

acetazolamide (Diamox®)

bumetanide (Bumex®)

furosemide (Lasix®)

hydrochlorothiazide (Oretic®, HydroDiuril®)

Thiazide-Like Derivative:

metolazone (Zaroxolyn®)

INDICATIONS:

Diuretics reduce the body's total volume of water and salt by increasing urinary excretion; due primarily to fact diuretics impair sodium chloride reabsorption in the renal tubules.

SIDE EFFECTS/ADVERSE REACTIONS:

Blood:	Aplastic anemia, agranulocytosis, leukopenia
CNS:	Drowsiness, headaches, dizziness, confusion
CV:	Volume depletion, dehydration, orthostatic hypotension
EENT:	Transient hearing loss
GI:	Nausea, anorexia, pancreatitis
HEPAT:	Hepatic encephalopathy
METAB:	Hypokalemia, hyperglycemia, impairment of glucose tolerance, alkalosis, gout
SKIN:	Dermatitis, photosensitivity, rash

NURSING IMPLICATIONS:

ASSESS:

1. Signs of metabolic alkalosis: drowsiness, restlessness.
2. Signs of decreased potassium: muscle cramps in legs, muscle weakness, paralysis, spasms, dizziness, fatigue, tachycardia, postural hypotension.
3. Confusion.
4. Hydration: decreased skin turgor, edema, condition of mucous membrane in mouth and nose.

5. Blood pressure: lying and standing.
6. Weight, input and output ratio, and decreased edema to determine fluid loss.
7. Allergies to **Sulfonamides, Thiazides**.
8. Elderly for excessive diuresis.
9. Patients/individuals with glaucoma for eye pain.
10. **furosemide (Lasix®)**: Symptoms of toxicity (e.g., tinnitus - ringing in the ears, severe abdominal pain, sore throat, fever.)

ADMINISTER:

Foods high in potassium (e.g., potatoes, citrus fruits) or potassium replacement as ordered by the medical provider. Use caution with foods that are high in potassium when taking a potassium sparing diuretic **triamterene/HCTZ (Dyazide®, Maxzide®)** unless instructed to take by medical provider.

EVALUATE:

Therapeutic effect: decrease in edema in feet, pulmonary edema and blood pressure.

TEACH:

1. To take medication early in day to avoid drowsiness and night time urination. Take with milk or food to avoid gastrointestinal upset.
2. To make position changes slowly to avoid hypotension
3. To eat foods high in potassium (e.g., bananas, potatoes, citrus fruits) if taking a potassium wasting diuretic.
4. To increase fluid intake unless contraindicated.
5. To avoid over-the-counter (OTC) drugs unless ordered by the medical provider
6. To use sunscreen if taking thiazide.
7. Diabetics: to monitor blood glucose level closely.
8. Patients/individuals with glaucoma to report eye pain to the medical provider.
9. Adverse reactions that might occur (e.g., leg cramps).

UNIT I, SECTION 5: CARDIOVASCULAR SYSTEM DRUGS

D. CLASSIFICATION: ANTIHYPERTENSIVE DRUGS

DRUG EXAMPLES:

Alpha Adrenergic Blockers:

prazosin hydrochloride (Minipress®)
terazosin hydrochloride (Hytrin®)

Angiotensin II Receptors:

losartan (Cozaar®)

Angiotensin-Converting Enzyme Inhibitors:

enalapril maleate (Vasotec®)
catopril (Capoten®)
lisinopril (Prinivil®, Zestril®)
ramipril (Altace®)

Antiadrenergic Agent, Peripheral:

reserpine (Serpasil®)

Beta Adrenergic Blockers:

metoprolol tartrate (Lopresor®)
propranolol (Inderal®)
atenolol (Tenormin®)

Calcium Channel Blockers:

nifedipine (Procardia®)

Central Alpha Adrenergic Agonist:

clonidine hydrochloride (Catapres®)
guanfacine (Tenex®)

Central Alpha Adrenergic Inhibitor:

methyldopa (Aldomet®)

Phethalazines:

hydralazine hydrochloride (Apresoline®)

Vasodilators:

cliazoxide (Hyperstat®)
minoxidil (Loniten®)

***Diuretics:**

furosemide (Lasix®): see section on diuretics

*Refer to section on Diuretics for side effects/adverse reactions and nursing implications.

INDICATIONS:

These drugs are used to lower blood pressure in patients who have a systolic/diastolic level of $\geq 140/90$ mmHg. The Joint Committee on Detection, Evaluation and Treatment of High Blood Pressure has introduced a new classification that includes the term "prehypertension" for those with blood pressure's ranging from 120-139 mmHg systolic and/or 80-89 mmHg diastolic. This new designation is intended to identify those individuals in whom early intervention by adoption of healthy lifestyles could reduce blood pressure, decrease the rate of progression or prevent hypertension entirely. Antihypertensive medications are primarily used to treat mild to severe essential hypertension. Virtually all parenteral preparation are reserved for the treatment of hypertensive emergencies. **Beta blockers, A2 Receptor Agonists, Calcium Channel Blockers** may be used to treat some psychiatric disorders (unlabeled uses).

SIDE EFFECTS/ADVERSE REACTIONS:

Blood:	Anemia, neutropenia, agranulocytosis
CNS:	Drowsiness, dizziness, fatigue, sedation, nervousness, headache, nightmares, confusion
CV:	Postural hypotension, bradycardia, severe rebound hypertension
EENT:	Nasal stuffiness (methyldopa [Aldomet®]), blurred vision and cough (enalapril maleate [Vasotec®]), dry mouth
GI:	Nausea, vomiting, constipation
GU:	Impotence, urinary retention
Skin:	Rash, pruritis
Other:	Weight gain, muscle cramps, bronchospasms, hypo- or hypercalcemia

NURSING IMPLICATIONS:

ASSESS:

1. Blood pressure, pulse, and respirations at frequent intervals; report any changes to RN/medical provider; obtain baseline scores.
2. Electrolytes particularly potassium.
3. Signs of depression (e.g., no interest in things, tiredness, feeling "blue").
4. Weight gain; weigh regularly; report gain of 5 pounds.
5. Kidney function: input and output ratio
6. **hydralazine HCl (Apresoline®):** for "flu-like" symptoms sensitivity reaction)
7. Diabetic patients/clients on **diazoxide (Hyperstat®)** for hyperglycemia.
8. **enalapril maleate (Vasotec®):** for non-productive cough.

ADMINISTER:

Give IV medications very slowly.

EVALUATE:

Therapeutic effects: decreases blood pressure and dysrhythmias.

TEACH:

1. To take medications as ordered, take at same time each day; **NOT** to discontinue before checking with the medical provider.
2. To avoid over-the-counter (OTC) medications unless ordered by the medical provider.
3. To make position changes slowly to prevent postural hypotension.
4. That symptoms of fatigue and nasal stuffiness should be reported but usually diminish over time.
5. **enalapril maleate(Vasotec®)**: if start coughing, report to the RN/medical provider.
6. **methyldopa (Aldomet®)**: may develop a tolerance to the drug and their urine may turn dark in toilet bowls treated with bleach.

UNIT I, SECTION 5: CARDIOVASCULAR SYSTEM DRUGS

E. CLASSIFICATION: VASODILATORS:

DRUG EXAMPLES:

Antianginal Nitrates:

isosorbide dinitrate (Iso-Bid®, Isordil®, Sorbitrate®)
nitroglycerin (Nitrostat®, Nitro-Bid®, Nitrol Ointment®)

Calcium Channel Blockers:

amlodipine (Norvasc®)
diltiazem hydrochloride (Cardizem®)
nifedipine (Procardia®)
verapamil hydrochloride (Calan®)

Coronary Vasodilators, Nonnitrate:

dipyridamole (Persantine®)
isosorbide dinitrate (Isordil®)

Peripheral Vasodilators:

isoxsuprine hydrochloride (Vasodilan®)

INDICATIONS:

Peripheral Vasodilators (e.g., isoxsuprine hydrochloride [Vasodilan®]) are used to treat symptoms of cerebrovascular insufficiency and peripheral vascular disease.

Coronary Vasodilators (e.g., nifedipine [Procardia®]) are used for angina; they work by reducing cardiac oxygen demand.

SIDE EFFECTS/ADVERSE REACTIONS:

CNS: Dizziness, light-headedness, flushing, headache (sometimes pounding), fainting, weakness
CV: Peripheral edema, hypotension, palpitations, tachycardia
EENT: Nasal stuffiness, sublingual burning, tinnitus
Skin: Skin irritation, rash
Other: Leg cramps

NURSING IMPLICATIONS:

ASSESS:

1. Cardiac status: blood pressure, pulse, respirations.
2. Activities that increase chest pains.
3. For increased bruising or abnormal bleeding for those on dipyridamole (Persantine®).

4. Signs of heart failure: swelling of hands and feet or shortness of breath. Notify medical provider if noted.

ADMINISTER:

1. **Oral Nitroglycerin** on an empty stomach.
2. **Patches:** Remove previous **Nitroglycerin patches**. Wear gloves when applying patches. Rotate application on non-hairy sites.
3. Sublingual: have patient/individual wet tablet with saliva and hold under tongue until dissolved.
4. **isorbide dinitrate (Sorbitrate®)** with food to decrease headaches.
5. Store in dark container.
6. Do not administer Amlodipine (Norvasc®) with grapefruit juice.

EVALUATE:

For therapeutic effect:

- a. **Central:** prevention of or decreased anginal pain.
- b. **Peripheral:** increased temperature in extremities, able to exercise without pain, increased long and short term memory.

TEACH:

1. To avoid alcohol and over-the-counter (OTC) drugs (unless ordered by the medical provider), and limit caffeine.
2. Avoid hazardous activities until stabilized.
3. To change position slowly to avoid dizziness.
4. Proper administration of sublingual and topical medications.
5. **dipyridamole (Persantine®):** may cause bleeding and slow clotting.
6. That **nifedipine (Procardia®)** may increase Digoxin levels and cause glucose intolerance.
7. **isoxsuprine hydrochloride (Vasodilan®):** keep extremities warm, avoid temperature changes, discontinue and notify RN/medical provider if rash appears.
8. **nitroglycerin patches:** to remove previous patches, to rotate application of patches on non-hairy sites, and to wear gloves when applying patches.
9. Amlodipine (Norvasc®) drug level and adverse reactions may occur if taken with grapefruit juice. Discourage use together.

UNIT I, SECTION 5: **CARDIOVASCULAR SYSTEM DRUGS**

F. CLASSIFICATION: VASOCONSTRICTORS

DRUG EXAMPLES:

Adrenergic Agonists, Catecholamines

dopamine hydrochloride (Intropin®)
isoproterenol hydrochloride (Isuprel®)

Adrenergic, Catecholamines:

epinephrine hydrochloride (Adrenalin®)
norepinephrine (Levophed®)

INDICATIONS:

These drugs raise blood pressure and cardiac output by constricting blood vessels. They most commonly are used in emergencies.

SIDE EFFECTS/ADVERSE REACTIONS:

- CNS:** Nervousness, headache, insomnia, weakness/drowsiness, restlessness, dizziness, cerebral hemorrhage
- CV:** Ventricular tachycardia or fibrillation, bradycardia, marked increase in peripheral resistance, decreased cardiac output, cardiac arrest, hypertension and then hypotension, palpitations, chest pain
- GI:** Nausea and vomiting
- GU:** Decreased urinary output
- METAB:** Metabolic acidosis, hyperglycemia
- RESP:** Pulmonary edema, shortness of breath
- LOCAL:** Irritation with extravasation, **norepinephrine (Levofed®)** can cause severe tissue damage if IV infiltrates

NURSING IMPLICATIONS:

ASSESS:

1. Blood pressure, pulse, urinary output, color and temperature of extremities when giving IV, and at regular intervals after infusion.
2. Injection site for sloughing.

ADMINISTER:

1. **DO NOT** administer discolored solutions.
2. Watch closely for side effects/adverse reactions.
3. If possible, **DO NOT** administer within 2 hours of bedtime; may cause insomnia.
4. Infusing:
 - a. Use large vein (e.g., antecubital fossa) to minimize risk of

- extravasation. Watch site carefully for signs of extravasation and if it occurs, stop infusion immediately and notify the medical provider .
- b. Check blood pressure until stable, check pulse rates, urinary output, color and temperature of extremities.

EVALUATE:

Therapeutic response: increased blood pressure with stabilization, ease of breathing.

TEACH:

1. Avoid smoking due to increased vasoconstriction.
2. Effects of drug and reason for administering.
3. Side effects/adverse reactions and what to report to RN/medical provider.

UNIT I, SECTION 5: **CARDIOVASCULAR SYSTEM DRUGS**

G. CLASSIFICATION: ANTILIPIDEMICS

DRUG EXAMPLES:

ANTILIPIDEMICS:

colestyramine (Questran®)
colestipol hydrochloride (Colestid®)
gemfibrozil (Lopid®)

CHOLESTEROL LOWERING AGENT (STATINS):

atorvastatin Calcium (Lipitor®)
ezetimibe (Zetia®)
fluvastatin sodium (Lescol®)
lovastatin (Mevacor®)
niacin (Niacor®, Nia-Bid®, etc.)
omega-3-acid ethyl esters (Omacor®)
pravastatin sodium (Pravachol®)
rosuvastatin calcium (Crestor®)
simvastatin (Zocor®)

VITAMIN B:

niacin (Niacin®, Nicobid®)

INDICATIONS:

These drugs are designed to lower blood levels of cholesterol; used in the treatment of hyperlipidemia and severe hypercholesterolemia unresponsive to diet and other drugs.

SIDE EFFECTS/ADVERSE REACTIONS:

BLOOD: Blood dyscrasias
CNS: Dizziness, fatigue, weakness, headache
GI: Constipation/fecal impaction, hemorrhoids, abdominal discomfort, flatulence, steatorrhea (excess fat in feces), activation of peptic ulcer, nausea, vomiting
SKIN: Dry skin, rashes, flushing
METAB: Hyperglycemia
OTHER: Vitamin A, D, K deficiencies, lens opacity (Lovastatin [Mevacor®])

NURSING IMPLICATIONS:

ASSESS:

1. Serum cholesterol, triglyceride levels, electrolytes if on extended time.
2. Bowel patterns, particularly constipation; all should be given

- cautiously to patients/individuals with a history of constipation
3. **Antilipids:** cardiac glycoside levels
 5. **Cholesterol Lowering Agents (Statins):** monitor liver and renal functioning tests initially and periodically to evaluate for changes.
 6. **niacin (Niacor®):** Niacin levels, cardiac status (e.g., rate, rhythm, quality), postural hypotension, dysrhythmias, CNS symptoms (e.g., headache, paresthesias, blurred vision).

ADMINISTER:

1. **niacin (Niacor®)** with meals.
2. **Antilipids:** before meals (most mixed with applesauce); other medications should be given 1 hour before or 4 hours after; supplemental vitamins (A,D,K) if levels are low.

TEACH:

1. Report symptoms of hypothermia: bleeding mucous membranes, dark tarry stools, hematuria, and/or bruising immediately.
2. Importance of compliance with drug regimen.
3. Need to quit smoking, eat foods low in fat, decrease alcohol intake, and exercise.
4. **gemfibrozil (Lopid®):** Notify the medical provider if have diarrhea, nausea, vomiting, chills, fever, or sore throat.
5. **lovastatin (Mevacor®):** Eye exams and blood work should be done at regular intervals. Notify the medical provider for symptoms of blurred vision, severe gastrointestinal symptoms, dizziness, or headache.
6. **niacin (Niacor®):** Flushing and increased feeling of warmth will occur after taking PO (will decrease over time). Remain lying down if hypotension occurs. Avoid sunlight if skin lesions are present.
7. To take with meals.
8. Taking aspirin 30 minutes before niacin may help decrease flushing sensation.

UNIT I, SECTION 6: CENTRAL NERVOUS SYSTEM

A. CLASSIFICATION: ANTIPSYCHOTICS (NEUROLEPTICS)

DRUG EXAMPLE:

Traditionals:

phenothiazines:

chlorpromazine (Thorazine®, Promapar®)

fluphenazine (Prolixin Decanoate® Permitil®Prolixin®)

perphenazine (Trilafon®)

thioridazine (Mellaril®)

trifluoperazine (Stelazine®)

haloperidol (Haldol Decanoate®Haldol®)

loxapine (Loxitane®)

molindone (Moban®)

thiothixene (Navane®)

Atypicals:

aripipraxole (Abilify®)

clozapine (Clozaril®)

olanzapine (Zyprexa®)

quetiapine (Seroquel®)

risperidone (Risperdal®)

ziprasidone (Geodon®)

INDICATIONS:

These drugs help modify thought disorders, blunted affect, and behaviors associated with psychosis. These agents lessen positive symptoms including paranoia, agitation, hallucinations, delusions, and autistic behavior. They may help some patients/individuals become more receptive to psychotherapy by controlling psychotic symptoms. They should be reserved for severe mental illness. They **DO NOT** cure mental illness. The atypical antipsychotics may also decrease negative symptoms (e.g., withdrawn behavior), improve cognition, and have fewer side effects than the traditional antipsychotics.

SIDE EFFECTS/ADVERSE REACTIONS:

BLOOD: Transient leukopenia, agranulocytosis with **clozapine (Clozaril®)**

CNS: *Extrapyramidal reactions (acute dystonic reaction, parkinsonism, akathisia, oculogyric crisis, tardive dyskinesia- see attached for descriptions), seizures, sedation, EEG changes, dizziness, potential for falls (especially in elderly)

CV: Orthostatic hypotension, tachycardia

EENT: Ocular changes (particularly with **thioridazine [Mellaril®]** and **chlorpromazine [Thorazine®]**), blurred vision.

GI:	Dry mouth, constipation
GU:	Urinary retention, dark urine, menstrual irregularities, inhibited ejaculation
HEPAT:	Cholestatic jaundice
METAB:	Hyperglycemia, weight gain, dyslipidemia
SKIN:	Photosensitivity, dermal allergic reactions, inability to regulate temperature (hyperthermia)
LOCAL:	Pain at injection site
OTHER:	Weight gain, increased appetite

NURSING IMPLICATIONS:

ASSESS:

1. Baseline blood pressure for possible orthostatic hypotension. Advise the patient/individual to stand or get up slowly.
2. Intake/output for urinary retention/constipation. Encourage the patient/individual to drink fluids, get adequate exercise, and eat foods high in fiber (fresh fruits and vegetables, bran).
3. For symptoms of agranulocytosis (sore throat, high fever, nosebleed, rash).
4. Monitor for extrapyramidal symptoms (akathisia, thick tongue, rigidity) and early symptoms of tardive dyskinesia (wormlike tongue movements). Notify RN/medical provider if symptoms occur.
5. These drugs produce an antiemetic effect which may mask toxic effects of these drugs or other drugs.
6. **Clozapine (Clozaril®)** requires careful blood monitoring for agranulocytosis.
7. Degree of medication compliance. Consider use of IM long acting injections (such as **haloperidol decanoate [Haldol Decanoate®]** and **fluphenazine decanoate [Prolixin Decanoate®]** if history of noncompliance exists.
8. Monitor for falls due to sedative effects of medication.
9. Monitor for signs of hyperthermia (decreased sweating).

ADMINISTER:

1. **DO NOT** mix **thiothixene (Navane®)** concentrate with caffeine containing beverages (e.g., colas, coffee, tea) or grape or apple juice; cloudiness or precipitation may occur.
2. When preparing parenteral solutions or liquid oral medications, avoid contact with skin, eyes, or clothing (will burn skin, eyes and discolor clothing).
3. When giving IM injections, inject deeply and slowly (recommend using the Z-tract particularly with **haloperidol decanoate (Haldol®)** or **fluphenazine decanoate (Prolixin®)**). Check blood pressure before and after giving until stabilized on medication and warn patient/individual about standing or sitting up quickly. **ROTATE** sites.

4. **DO NOT** give **clozapine (Clozaril®)** with Benzodiazepines; may cause respiratory arrest.
5. Have the patient/individual use sunscreen agents or protective clothing when out in the sun due to photosensitivity.
6. Relieve dry mouth with sugarless gum, liquids, or candy; mouthwash; lozenges; or ice chips.
7. Provide patients/individuals on **clozapine (Clozaril®)** who drool with a handkerchief/bandana.
8. When giving oral concentrates, mix with at least 4 oz. of liquid other than water to disguise taste.

TEACH:

1. **DO NOT** to combine these drugs with alcohol or other depressants.
2. **DO NOT** to stop taking these drugs abruptly.
3. About working around dangerous equipment and driving due to sedative effect of many of these drugs.
4. Decrease intake of sugar and concentrated carbohydrates as weight gain is common with atypical antipsychotics.
5. Encourage moderate exercise.
6. Avoid exposure to excessive heat secondary to hyperthermia risk.

***Extrapyramidal Reactions:**

Dystonia: involuntary, irregular jerking contortions of the muscles of the trunk and extremities which are sustained and non-patterned. Patients/individuals often complain of a "thick tongue" and inability to hold neck straight. Other symptoms may include cogwheeling and twisting contortions of the body often seen when walking.

Oculogyric crisis: is a type of dystonia where the eyes roll back accompanied by extreme arching of the back with the head thrown back. This usually occurs early in treatment and is often associated with high dosages of traditional antipsychotics (e.g., **Haloperidol-Haldol®**).

Dyskinesia: difficulty or distortion in performing voluntary movements (tic, chorea, spasm, myoclonus).

Tardive Dyskinesia: late onset of involuntary movements that primarily affect the mouth, shoulders, and trunk. Movements may be smooth, rhythmic, serpentine-like or jerking, purposeless, irregular movements like those seen with Huntington's Chorea.

Akathisia: extreme inability to sit or stand still. The body is in constant movement in which the patient/individual is unable to stop. The patient/individual will describe feeling as "though he/she is jumping out of his/her skin." It may be confused with agitation.

Parkinson's Syndrome: includes muscular rigidity, mask like facial expression with sagging mouth, involuntary movements of the head, tremors of the feet and hands at rest, pill-rolling movements of the forefinger and thumb, cogwheeling, stove-pipe rigidity and shuffling gait. There may be drooling. The patient/individual appears rigid and not able

to move, yet agitated.

Akinesia: masked facies with decreased expressions and blank stares, loss of movement, difficulty walking, sitting and standing.

****Antiparkinson drugs such as benztropine mesylate (Cogentin®) are used to treat extrapyramidal reactions associated with the use of antipsychotics.**

UNIT I, SECTION 6: CENTRAL NERVOUS SYSTEM

B. CLASSIFICATION: ANTIANXIETY DRUGS (ANXIOLYTICS)

DRUG EXAMPLE:

Benzodiazepines:

alprazolam (Xanax®)
chlordiazepoxide hydrochloride (Librium®)
clonazepam (Klonopin®)
clorazepate dipotassium (Tranxene®)
diazepam (Valium®)
lorazepam (Ativan®)
midazolam hydrochloride (Versed®)
oxazepam (Serax®)

hydroxyzine hydrochloride (Vistaril®, Atarax®)

bupirone hydrochloride (BuSpar®)

INDICATIONS:

These drugs are used to treat anxiety, agitation, relax skeletal muscles, prevent and treat withdrawal, and supply preop medication for general anesthesia. They may also be used to treat rashes. Some of the **Benzodiazepines (e.g., lorazepam [Ativan®], diazepam [Valium®])** are used to treat seizure disorders.

SIDE EFFECTS/ADVERSE REACTIONS

CNS: Drowsiness/lethargy, fainting hangover feeling, confusion, ataxia, excitement, psychological and physical dependency, increased risk for falls (especially in the elderly)
CV: Orthostatic hypotension
GI: Nausea/vomiting, dry mouth, abdominal pain
GU: Inability to void or ejaculate
RESP: Respiratory depression, apnea
SKIN: Allergic reactions

Benzodiazepines should be used with caution in the elderly, at low doses for short periods of time.

NURSING IMPLICATIONS:

ASSESS:

1. For sedation and respiratory depression.
2. Monitor blood pressure.

ADMINISTER:

1. Stay with the patient/individual until he/she has swallowed his/her medicine to prevent omission and hoarding which might lead to overdose.
2. If giving IM, give in large muscle.
3. **WARNING: diazepam (Valium®) with clozapine (Clozaril®) may cause respiratory arrest.**

TEACH:

1. **NOT** to combine these drugs with alcohol or other depressant drugs.
2. About working around dangerous equipment and driving due to sedative effects of medication.
3. Benzodiazepines are potentially addicting. Abrupt discontinuation may lead to withdrawal symptoms such as seizures; dose should be tapered over a two week period of time.

UNIT I, SECTION 6: CENTRAL NERVOUS SYSTEM

C. CLASSIFICATION: ANTIDEPRESSANTS

DRUG EXAMPLES:

Tricyclics (TCA's):

amitriptyline hydrochloride (Elavil®, Emitrip®, Endep®, Amitril®)
amoxapine (Asendin®)
clomipramine hydrochloride (Anafranil®)
desipramine hydrochloride (Norpramin®, Pertoframe®)
doxepin hydrochloride (Sinequan®)
imipramine hydrochloride (Tofranil®)
nortriptyline hydrochloride (Aventyl®, Pamelor®)
duloxetine HCl (Cymbalta®)

Selective Serotonin Reuptake Inhibitors (SSRI's):

citalopram (Celexa®)
escitalopram (Lexapro®)
fluoxetine (Prozac®)
fluroxamine (Luvox®)
olanzapine/fluoxetine (Symbyax®)
paroxetine (Paxil®)
sertraline (Zoloft®)

Miscellaneous:

bupropion hydrochloride (Wellbutrin®)
maprotiline hydrochloride (Ludiomil®)
nefazodone (Serzone®)
trazodone (Desyrel®)
venlafaxine (Effexor®)

INDICATIONS:

These drugs are used to treat depression, prevent recurrent depression, panic disorders, and enuresis in children.

SSRI's have less anticholinergic, sedation, and weight gain side effects, therefore, patients/individuals are more compliant with administration. **Fluoxetine (Prozac®)** and **paroxetine (Paxil®)** are also approved to treat obsessive-compulsive disorders.

SIDE EFFECTS/ADVERSE REACTIONS:

CNS: Drowsiness, dizziness, excitation, mania
CV: Hypertension, hypertensive crisis, orthostatic hypotension
EENT: Blurred vision, aggravation of glaucoma
GI: Paralytic ileus, dry mouth, diarrhea, urinary retention
GU: Impotence, amenorrhea

SKIN: Urticaria, rash, photosensitivity

NURSING IMPLICATIONS

ASSESS:

1. Vital signs as prescribed by the Medical Provider, monitor blood pressure for hypotension and orthostatic hypotension, and level of drowsiness during first week of antidepressant therapy.
2. For EPS, primarily in elderly: rigidity, dystonia, and akathisia.
3. **TCA's:** monitor closely for anticholinergic symptoms (constipation, urinary retention and dry mouth).
4. Mental status: mood, sensorium, affect; suicidal tendencies, increase of psychiatric symptoms: depression, panic disorder.
5. For withdrawal symptoms: headache, nausea, vomiting, muscle pain, weakness; **DOES NOT** usually occur unless drug is discontinued abruptly.
6. If alcohol is consumed, call the Medical Provider.
7. **For rapid improvement in mood and energy level. When this occurs, the risk of suicide increases.**

ADMINISTER:

1. Increase fluid and bulk in diet to help prevent constipation and urinary retention.
2. With food or milk to reduce risk of GI symptoms.
3. For patients/individuals taking tricyclic antidepressants, check mouth to insure swallowing and to prevent hoarding for later use; overdose may be fatal.
5. Cymbalta capsules should be swallowed whole; do not crush or open and sprinkle on food; do not allow patient/individual to chew.

TEACH:

1. That therapeutic effects may take 2-3 weeks.
2. To use caution in driving and other activities requiring alertness because of possible drowsiness, dizziness, and blurred vision.
3. To avoid alcohol ingestion and other CNS depressants.
4. To **NOT** withdraw these drugs abruptly. Symptoms such as nightmares, nausea and shakiness may occur (particularly with tricyclics).
5. To wear sunscreen since photosensitivity may occur.

UNIT I, SECTION 6: CENTRAL NERVOUS SYSTEM

D. CLASSIFICATION: ANTIMANIA

DRUG EXAMPLE:

- lithium carbonate (Eskalith®, Lithotab®, Lithobid®)
- lithium citrate
- *carbamazepine (Tegretol®, Equetro®)
- *valproic acid (Depakene®)
- *divalproex sodium (Depakote®, Depakote ER®)
- *clonazepam (Klonopin®)
- *lorazepam (Ativan®)

INDICATIONS:

These drugs are used to treat and prevent the reoccurrence of acute mania or hypomanic episodes and mood disorders. ***Carbamazepine (Tegretol®), valproic acid (Depakene®), divalproex sodium (Depakote®), and clonazepam (Klonopin®),** primarily anticonvulsant drugs are also used in the treatment of acute mania, especially when Lithium is ineffective or contraindicated. ***Refer to Anticonvulsant Drugs for side effects/adverse reactions and nursing implications for these drugs.**

SIDE EFFECTS/ADVERSE REACTIONS:

- CNS:** Tremors, drowsiness, headache, confusion, restlessness, psychomotor retardation, stupor, coma, blackouts, seizures, worsened organic brain syndrome, impaired speech, ataxia
- CV:** Reversible EKG changes, arrhythmias, hypotension, edema, peripheral circulatory collapse.
- EENT:** Tinnitus (ringing in the ears), impaired vision
- GI:** Nausea, vomiting, anorexia, diarrhea, dry mouth, thirst, metallic taste.
- GU:** Polyuria, glycosuria, incontinence, renal toxicity with long term use
- METAB:** Transient hyperglycemia, hypothyroidism, hyperthyroidism, hyponatremia
- SKIN:** Rash, urticaria, loss of sensation, drying and thinning of hair, acne

NURSING IMPLICATIONS:

ASSESS:

1. **Lithium**
 - a. blood levels weekly to monthly (per facility policy) and should be done at least 12 hours after the last dose of Lithium. Blood levels should remain in the 0.8 to 1.2 mEq/L range for healthy adults and lower for the elderly.

- b. intake of adequate fluids (at least 2000 ml's per day is recommended). Monitor intake and output.
- c. for consistent salt intake; low salt diets can be dangerous. Excessive fever, nausea and vomiting, or diarrhea may indicate toxic levels or the need for a salt supplement.
- d. tablets produce nausea more often than capsules.
- e. for tremors; may be responsive to **propranolol (Inderal®)**.
- f. for therapeutic response: decrease in excitement, motor activity.
- g. contraindications include: significant renal disease, organic brain disease, low salt diet, cardiac disorders. Caution should be used with patients/clients with thyroid problems and who are pregnant.
- h. drug interactions: with **haloperidol (Haldol®)** may cause encephalopathic syndrome and possible brain damage; Aminophylline, Phenothiazines, and Sodium Chloride cause high Lithium excretion resulting in decreased effect; some diuretics cause high reabsorption of Lithium and can cause toxicity.
- i. weigh routinely to monitor for weight gain and edema.

ADMINISTER:

Lithium after meals (per facility policy) and with plenty of water to minimize GI upset.

TEACH:

1. To have routine monitoring of blood levels, urine concentrating ability, thyroid functioning and blood sugar levels as ordered by the medical provider.
2. The differences between mild, common side effects (e.g., polyuria, thirst, transient nausea) from those indicating toxicity (e.g., diarrhea, vomiting, tremor, drowsiness, muscle weakness, ataxia) as well as drugs that may interact with Lithium.
3. Diet modification to prevent / control weight gain.

UNIT I, SECTION 6: CENTRAL NERVOUS SYSTEM

E. CLASSIFICATION: PSYCHOSTIMULANTS

DRUG EXAMPLE:

caffeine (No Doz®, Vivarin®)
dextroamphetamine sulfate (Dexedrine®)
methylphenidate hydrochloride (Ritalin®, concerta®)
modafinil (Provigil®)
pemoline (Cylert®)

INDICATIONS:

These drugs may be used for treatment of exogenous obesity, narcolepsy, and ADHD (Attention Deficit/Hyperactivity Disorder) in children, adolescents and adults; in initial or sustained treatment of major depression in geriatric patients/individuals; to treat depressive symptoms in patients/individuals with Alzheimer's Disease and related dementias; and with withdrawn and apathetic geriatric patients/individuals. These drugs have also been found to be effective when used in conjunction with tricyclic antidepressants to treat depression in medically ill patients/individuals.

SIDE EFFECTS/ADVERSE REACTIONS:

CNS: Hyperactivity, insomnia, restlessness, headache, chills, stimulation, talkativeness, irritability, aggressiveness, seizures, Tourette Syndrome
CV: Palpitations, tachycardia, hypertension, hypotension
GI: Nausea, vomiting, anorexia, dry mouth, diarrhea, weight loss, constipation, metallic taste
GU: Impotence
RESP: Bronchospasm
METAB: Increased liver enzyme levels (**pemoline[Cylert®]**)
HEM: Thrombocytopenia, decreased blood glucose levels

NURSING IMPLICATIONS:

ASSESS:

1. Use cautiously in patients/individuals with a history of drug abuse, hypertension, history of seizures, diabetes, EEG abnormalities, or impaired renal function.
2. Should be prescribed for obesity only when the patient/individual is on a weight reduction program that includes dietary changes and exercise. Tolerance develops and weight loss will not occur without additional methods.
3. For tolerance or psychological dependence, observe for signs of excessive stimulation.
4. Blood pressure.

5. Height and weight in children on prolonged therapy. These medications may delay the growth spurt, but children will attain normal height when drug is discontinued.

ADMINISTER:

1. Give at least 6 hours before bedtime to prevent sleep disturbance.
2. If prescribed for obesity, give 30-60 minutes before meals.
3. These are Schedule II controlled substances (except caffeine); the availability and use of these drugs are restricted.

TEACH:

1. To limit caffeine consumption which may increase irritability and over-stimulate.
2. That fatigue may result as the drug effects wear off; advise the patient/individual that they may need more rest.

UNIT I, SECTION 6: CENTRAL NERVOUS SYSTEM

F. CLASSIFICATION: ANTICONVULSANTS

DRUG EXAMPLE:

carbamazepine (Tegretol®)	mephenytoin (Mesantoin®)
clonazepam (Klonopin®)	oxcarbazepine (Trileptal®)
diazepam (Valium®)	phenobarbital (Barbita®)
divalproex sodium (Depakote®)	phenytoin (Dilantin®)
fosphenitoin sodium (Cerebyx®)	primidone (Mysoline®)
gabapentin (Neurontin®)	tiagabine hydrochloride (Gabitril®)
lamotrigine (Lamictal®)	topiramate (Topamax®)
levetiracetam (Keppra®)	valproic acid (Depakene®)
	zonisamide (Zonegran®)

INDICATIONS:

Anticonvulsants primarily control seizure disorders by preventing or reducing the frequency and severity of seizures. **Carbamazepine (Tegretol®), valproic acid (Depakene®), divalproex sodium (Depakote®)** and **clonazepam (Klonopin®)** may be used for agitation or increased motor activity seen with mania and psychosis.

SIDE EFFECTS/ADVERSE REACTIONS:

CNS:	Drowsiness, mental dullness, coma, ataxia, excitement
CV:	Hypotension, weakness
GI:	Indigestion, nausea and vomiting, constipation, gingival hypertrophy (gum overgrowth)
GU:	Kidney damage
HEPAT:	Liver damage
SKIN:	Rashes
OTHER:	Hypoglycemia

Carbamazepine (Tegretol®), valproic acid (Depakene®), divalproex sodium (Depakote®): Blood dyscrasias (e.g. Aplastic Anemia and agranulocytosis); symptoms include sore throat, bruises, fever nosebleed
phenytoin (Dilantin®): gum over-growth, folic acid depletion, intoxication
lamotrigine (Lamictal®): life threatening rash

NURSING IMPLICATIONS:

ASSESS:

1. Diabetics for hypoglycemia.
2. For symptoms of life threatening blood dyscrasias and bone marrow depression (e.g. sore throat, bruises, fever, nosebleed).
3. For seizures. Keep an accurate record.
4. For fatal rash with **Lamotrigine (Lamictal®)**.

5. For kidney stones with **Topiramate (Topamax®)**.

ADMINISTER:

1. **DO NOT** allow **phenytoin (Dilantin®)** capsules and prompt release preparations to be interchanged.
2. Give PO medications with milk or food.

PROVIDE:

1. Good mouth care.
2. Accurate seizure record.
3. Monitor patients/clients when smoking (per facility policy).
4. Supervise patients/clients walking and raise bedrails if indicated (per facility policy).

TEACH:

1. **DO NOT** stop taking these drugs abruptly.
2. To avoid hazardous activities.
3. That blood studies should be done routinely per facility policy.
4. To notify the medical provider immediately if fever, sore throat, or rash (symptoms of blood dyscrasias); mouth ulcers; or easy bruising or bleeding occur.
5. That careful oral hygiene helps control and minimize gingival hypertrophy.

UNIT I, SECTION 6: CENTRAL NERVOUS SYSTEM

G. CLASSIFICATION: SEDATIVE/HYPNOTICS

DRUG EXAMPLE:

amobarbital (Amytal Sodium ®)	secobarbital sodium (Seconal®)
chloral hydrate (Noctec®)	temazepam (Restoril®)
ethchlorvynol (Placidyl®)	triazolam (Halcion®)
flurazepam hydrochloride (Dalmane®)	zaleplon (Sonata®)
pentobarbital (Nembutal®)	zolpidem tartrate (Ambien®)

INDICATIONS:

These drugs are used to treat insomnia and promote sleep. If a **sedative effect** is desired, a lower dose is used but if a **hypnotic effect** is needed, a higher dose is used.

SIDE EFFECTS/ADVERSE REACTIONS:

BLOOD:	Eosinophilia, thrombocytopenia
CNS:	Drowsiness, lethargy, depression, hangover, dizziness, mental confusion, nightmares, ataxia, dependence.
CV:	Hypotension
EENT:	Unpleasant after taste, dry mouth, blurred vision
GI:	Nausea, vomiting, diarrhea, gastritis
GU:	Bladder atony
LOCAL:	Pain, irritation, sterile abscess at injection site
METAB:	Elevated liver enzymes
RESP:	Respiratory depression
SKIN:	Rash, urticaria
OTHER:	Allergic reaction, fever, respiratory depression

NURSING IMPLICATIONS:

ASSESS:

1. Ensure medication is swallowed to guard against hoarding.
2. For signs of psychological and physical dependence.
3. For increased symptoms of depression in patients/individuals who are depressed.
4. For periods of elation, confusion, or euphoria prior to sedation.
5. Some of these drugs may potentiate tricyclic antidepressants and may be contraindicated with antihistamines and/or antipsychotics.
6. Monitor for falls due to sedative effects of medications.
7. Assess for carry over effect the next day (difficulty waking up, drowsiness during the day, difficulty with coordination).

PROVIDE:

Quiet environment.

TEACH:

1. To use caution when trying to perform tasks which require alertness or coordination since these drugs may impair mental alertness.
2. To **NOT** combine these drugs with alcohol; small doses may be fatal.

UNIT I, SECTION 6: CENTRAL NERVOUS SYSTEM

H. CLASSIFICATION: ANALGESICS - NARCOTIC AND OPIOID ANALGESICS

DRUG EXAMPLES:

codeine phosphate (Paveral®)
codeine sulfate
fentanyl transdermal system (Duragesic®)
hydromorphone hydrochloride (Dilaudid®)
meperidine hydrochloride (Demerol®)
methadone hydrochloride (Dolophine®)
morphine sulfate (Astramorph®)
oxycodone hydrochloride (OxyContin®)
propoxyphene hydrochloride (Darvon®, Dolene®)
tramadol hydrochloride (Ultram®)
combination products: Darvocet-N®, Percocet®, Tylenol #3®, Lortab®,
Vicoden®, etc.

INDICATIONS:

These drugs relieve moderate to severe pain.

SIDE EFFECTS/ADVERSE REACTIONS:

CNS: Sedation, mental clouding, dizziness, seizures (with large doses)
CV: Hypotension, bradycardia, tachycardia
EENT: Blurred vision, diplopia
GI Nausea, vomiting, constipation, dry mouth
GU: Urine retention and urgency
LOCAL: Pain at injection site, local tissue irritation
RESP: Respiratory depression

NURSING IMPLICATIONS:

ASSESS:

1. Vital signs as ordered until stable.
2. Pain assessment per facility protocol.
3. Potential for falls.

ADMINISTER:

1. These drugs are regulated under the Controlled Substance Act, therefore, accounting must be done for all doses.
2. Use cautiously in patients/individuals with head injury, pulmonary disease, and decreased respirations.
3. Dosage usually reduced with elderly and debilitated patients/individuals.
4. For management of acute pain, may see high doses.
5. Patients/individuals on these drugs may require laxative or stool

softeners to prevent/relieve constipation.

6. Use these drugs cautiously with other CNS depressants.

TEACH:

1. Warn ambulatory patients/individuals to avoid activities that require alertness and coordination until CNS drug effects are known.
2. Caution patients/individuals to avoid alcoholic beverages when taking these drugs.

UNIT I, SECTION 6: CENTRAL NERVOUS SYSTEM

I. CLASSIFICATION: ANALGESICS: NON-NARCOTIC ANALGESICS, NON-STEROIDAL ANTI-INFLAMMATORY AND ANTIPYRETIC

DRUG EXAMPLE:

acetaminophen (Tylenol®, Datril®, Etc.)

Non-Steroidal Anti-inflammatory agents (NSAID's):

Ibuprofen (Advil®, Nuprin®)

Ketoprofen (Orudis®)

Naproxen (Aleve®, Anaprox®)

naratriptan (Amerge®)

phenazopyridine hydrochloride (Azo-standard, Pyridium®)

salicylates (Aspirin®, Ecotrin®)

sumatriptan (Imitrex®)

zolmitriptan (Zomig®)

INDICATIONS:

These drugs are most frequently used for pain relating to arthritis, menstrual cramps, and urinary tract irritation.

Anti-inflammatory analgesics are used to relieve inflammation, swelling, stiffness, and joint pain caused by arthritis. Also, they can be used for menstrual cramps.

Salicylates are used to reduce mild pain or fever, to prevent thromboembolic disorders, transient ischemic attacks (TIA's), and to reduce the risk of heart attacks.

phenazopyridine hydrochloride (Pyridium®) is used for urinary tract irritation and bladder spasms by providing an analgesic, anesthetic action on the urinary mucosa.

Sumatriptan (Imitrex®) is used to treat migraine headaches.

SIDE EFFECTS/ADVERSE REACTIONS:

BLOOD: Prolonged bleeding time

CNS: Dizziness, somnolence, insomnia, headache, fatigue, vertigo

EENT: Tinnitus and hearing loss

GI: Nausea, vomiting, GI distress, occult bleeding

HEPAT: Abnormal liver function studies, hepatitis, severe liver damage with toxic doses

SKIN: Rash, urticaria, bruising

OTHER: Hypersensitivity manifested by anaphylaxis and/or asthma

NURSING IMPLICATIONS:

ASSESS:

1. **Salicylates** such as **Aspirin®** and **Ecotrin®** should **NOT** be used with

- patients/individuals who have gastric ulcers, GI bleeding, or are on anticoagulant therapy since the risk of bleeding is increased.
2. Children on **acetaminophen (Tylenol®)** for spiking temperature. Notify the medical provider.
 3. **phenazopyridine HCl (Pyridium®)** for yellow discoloration of the skin and/or sclera as these symptoms may indicate accumulation caused by impaired renal excretion.
 4. Pain assessment per facility protocol.

ADMINISTER:

1. Administer with milk or food to reduce GI irritation.
2. Do not crush or chew sustained-release or enteric-coated forms; swallow whole.
3. **DO NOT** give oral or rectal **acetylsalicylic acid (Aspirin®)** to children or teenagers who have or are recovering from chickenpox or flulike symptoms because of the risk of developing Reye's syndrome.

TEACH:

1. Warn patients/individuals on **acetylsalicylic acid (Aspirin®)** to report: ringing of the ears, blurred vision, gastric burning, tarry stools, bruising or skin rashes.
2. That high doses of **acetaminophen (Tylenol®)** or unsupervised use can cause liver damage.
3. **NOT** to exceed recommended dosage; acute poisoning with liver damage may result.
4. That when **ibuprofen (Advil®)** is co-administered with antibiotics, an antiplatelet effect can result with an increased potential for bleeding episodes.
5. That when **ibuprofen (Advil®)** is co-administered with lithium, an increase in serum lithium may occur.
6. That **phenazopyridine HCl (Pyridium®)** colors the urine red or orange and may stain fabrics.

UNIT I, SECTION 7: RESPIRATORY SYSTEM DRUGS

A. CLASSIFICATION: EXPECTORANTS AND ANTITUSSIVES PREPARATIONS

DRUG EXAMPLES:

Expectorants:

guaifenesin (Mucinex®, Anti-Tuss®, Robitussin®, 2-G®)

Antitussives:

benzonatate (Tessalon Perles®)

codeine sulfate

dextromethorphan hydrobromide (Delsym®, Vicks Formula 44e®, Robitussin DM®)

INDICATIONS:

Expectorants aid in the expulsion of mucous and break up congestion in the respiratory tract. **Antitussives** are used to relieve or suppress coughing.

SIDE EFFECTS/ADVERSE REACTIONS:

CNS: Tolerance, physical dependence, sedation (Codeine Sulfate)

CV: Palpitations

GI: Constipation, nausea, vomiting

NURSING IMPLICATIONS:

ASSESS:

1. Cough type: frequency and character, including sputum.
2. For bronchospasms with the elderly.

ADMINISTER:

1. Non-alcohol base for alcoholics and sugarless base for diabetics.
2. Decrease antitussive dose for elderly due to slowed metabolism.
3. Store at room temperature.
4. Increase fluid intake and humidity to increase secretions.

EVALUATE:

Therapeutic response: Absence of cough and decreased chest congestion.

TEACH:

1. Maintain adequate fluid intake.
2. Monitor characteristics and frequency of cough. Notify the RN/Medical Provider if cough persists.
3. Avoid environmental irritants such as smoke filled rooms, cleaning fluids, perfumes, dust, etc.
4. **Antitussives:** avoid CNS depressants such as alcohol while on **Antitussives**.

UNIT I, SECTION 7: RESPIRATORY SYSTEM DRUGS

B. CLASSIFICATION: BRONCHODILATORS (SPASMOLYTICS, ADRENERGICS, ANTICHOLINERGIC, MUCOLYTICS)

DRUG EXAMPLES:

Spasmolytics:

aminophylline or theophyllin ethylenediamine (Aminophyllin®)
theophylline (Theobid®, Theo-Dur®, Slo-Bid®, Theo-24®)

Adrenergics:

Beta 2-Agonists – Short Acting

albuterol (Proventil HFA®, Ventolin HFA®, Accuneb®, Volmax®)
levalbuterol hydrochloride (Xopenex®)
isoproterenol hydrochloride (Isuprel®)
metaproterenol sulfate (Alupent®, Metaprel®)
terbutaline sulfate (Brethine®)
pirbutero acetate (Maxair®)
epinephrine (adrenaline) – (Primatene Mist®)
epinephrine hydrochloride (Epi-pen®)

Beta 2-Agonists – Long Acting

fluticasone propionate and salmeterol inhalation powder (Advair Diskus®)
salmeterol xinafoate inhalation powder (Serevent Diskus®)
formoterol fumarate (Foradil Aerolizer®)

Anticholinergics

tiotropium bromide (Spireva®)
ipratropium bromide (Atrovent®)

Mucolytics

acetylcysteine (mucomyst®)

INDICATIONS:

These drugs are used to relieve spasms of the smooth muscles in the respiratory tract and dilate airways to improve breathing.

SIDE EFFECTS/ADVERSE REACTIONS:

CNS: Headache, restlessness, insomnia, mild tremors, dizziness, insomnia, seizures (particularly in individuals with seizure disorders)

CV: Palpitations, tachycardia, anginal pains, unstable BP

EENT: Dry mouth

GI: Nausea, vomiting, anorexia,
METAB: Hyperglycemia
MUSC: Muscle cramps
RESP: Increased respiratory rate, bronchial edema

levalbuterol hydrochloride (Xopenex)

CV: cardiovascular side effects/adverse reactions (listed above) are minimized

tiotropium bromide (Spireva)

EENT: eye pain, cataracts, glaucoma, laryngitis, rhinitis
GI: constipation
RESP: cough
OTHER: herpes zoster, infections, flu-like syndrome, candidiasis

NURSING IMPLICATIONS:

ASSESS:

1. Vital signs, particularly respiratory and pulse for tachycardia.
2. Obtain peak and trough levels as ordered by the Medical Provider.
3. For those who have cardiac arrhythmias, are sensitive to caffeine or have renal disease; as some of the listed drugs may be contraindicated.
4. **Spasmolytics:**
 - a. Measure intake and output, diuresis (particularly in the elderly).
 - b. Allergic reactions: rash and itching; discontinue if these occur.
 - c. **theophylline (Theobid®)** levels as ordered by the medical provider.
 - d. **theophylline (Theobid®):** for toxicity: irritability, insomnia, restlessness, tremors, nausea and vomiting or hemoptysis.
5. **Adrenergics:**
 - a. **albuterol (Proventil®):** patients/individuals ability to self medicate by inhalation.
 - b. **isoproterenol (Isuprel®):** for signs of blood dyscrasias (e.g., fever, sore throat, rash), injection site for tissue sloughing, and urinary hesitancy.
 - c. **metaproterenol sulfate (Alupent®)** and **terbutaline sulfate (Brethine®):** tolerance with long-term therapy and rebound bronchospasms.
6. **Anticholinergic:**
 - a. **tiotropium bromide (Spireva®)** and **ipratropium bromide (Atrovent®):** patients/individuals ability to self medicate by inhalation.

ADMINISTER:

1. With or after meals.
2. **terbutaline sulfate (Brethine®):** give at least 2 hours before bedtime to reduce sleep disturbance.

3. Nebulized medications/treatments are given with the patient in the upright position as the patient inhales slowly and deeply over 3 to 5 seconds and then exhales after about 10 seconds allowing medication to better deposit in the airway.
4. A spacer device attached to a Metered dose Inhaler (MDI) is often easier and makes the inhaler 20% more effective in delivering inhaled medication.
5. **Spasmolytics:** with 8 ounces of water if nausea occurs.
6. **anticholinergic (Spireva):** Place capsule without opening into HandiHaler base. Use this medication (capsule) only with the HandiHaler inhalation device. Keep capsule in sealed blisters and remove just before use. *Capsules are for inhalation only and should not be swallowed.

EVALUATE:

Therapeutic effect: decreased bronchospasms, dyspnea, and wheezing.

TEACH:

1. Take as ordered (**Do NOT** skip or double up on dose).
2. To avoid over-the-counter (OTC) drugs (particularly those with Ephedrine) unless ordered by the medical provider.
3. Avoid alcohol, caffeine, smoking, and smoke filled rooms.
4. To increase fluid intake.
5. **Spasmolytics:** Long acting medications used in the prevention of bronchospasm. Take oral medication with 8 ounces water; notify the medical provider of side effects and changes in smoking habits; warn about driving and other activities that require alertness. May decrease effectiveness of antibiotics containing erythromycin, seizure and ulcer medications.
 - a. **aminophylline (Aminophylline®):** stay lying down 15 minutes after suppository, if tolerated.
 - b. **theophylline (Theobid®):** **DO NOT** crush or chew time released medication.
6. **Adrenergics: Beta 2-Agonists - short acting,** typically work within 20 minutes and last 4-6 hours. Also used to prevent exercise-induced asthma. **Beta 2-Agonist – long acting** are used to provide control of asthma symptoms, not quick relief. Benefits should last up to 12 hours but take longer to begin working.
 - a. clean inhaler daily by rinsing inhaler under running warm water.
 - b. **metaproterenol sulfate (Alupent®):** notify RN/medical provider of chest pains, headache, weakness, dizziness, or anxiety. Store MDI in a dark, dry area at room temperature to produce smaller medication particles that will allow better distribution of medication throughout the lungs. The MDI may be warmed by keeping it close to the body and/or rolling it between hands.
7. **Anticholinergics**
 - a. **tiotropium bromide (Spireva):** report eye pain, blurred vision, visual halos or colored images immediately. Do not swallow capsules or get capsule powder into eyes. Store capsules at room temperature and do not expose the capsules to extreme temperatures or moisture. Do not store capsules in the HandiHaler.
8. **Mucolytics**
Store in refrigerator once vial has been opened.

UNIT I, SECTION 7: RESPIRATORY SYSTEM DRUGS

C. CLASSIFICATION: ANTIHISTAMINES

DRUG EXAMPLES:

Histamine Antagonists:

brompheniramine maleate (Dimetane®, Dimetapp®)
cetirizine hydrochloride (Zyrtec®)
chlorpheniramine maleate (Aller-Chlor®)
diphenhydramine hydrochloride (Benadryl®)
fexofenadine hydrochloride (Allegra®)
loratidine (Claritin®)

Leukotriene Inhibitor

montelukast sodium (Singulair®)

Phenothiazine Derivative:

promethazine (Phenergan®)

INDICATIONS:

These drugs are used to relieve symptoms of allergic reactions and in combination products to control common cold symptoms.

diphenhydramine hydrochloride (Benadryl®) is used as a sedative and may be used to reduce rigidity and drug induced extrapyramidal reactions.

promethazine (Phenergan®) may be used for control of nausea and vomiting.

SIDE EFFECTS/ADVERSE REACTIONS:

CNS: Drowsiness (most common), insomnia, headache, personality changes

CV: Hypotension, hypertension, tachycardia, arrhythmias

GI: Constipation, dry mouth

NURSING IMPLICATIONS:

ASSESS:

1. Intake and Output.
2. Urinary retention, frequency, and dysuria; report any of these to the medical provider.
3. Respiratory status: rate, rhythm, secretions, wheezing, chest tightness, etc.
4. Blood studies (CBC) with long-term therapy.

ADMINISTER:

1. Hard candy, sugarless gum, good mouth care for dry mouth.
2. Storage: airtight container.
3. **promethazine (Phenergan®)**, when given for motion sickness, should be given 30 minutes before travel time.

EVALUATE:

Therapeutic response: decreased nasal congestion or secretions, nausea or rash; increased sedation.

TEACH:

Caution about driving and operating equipment due to drowsiness.

UNIT I, SECTION 8: EYE, EAR, NOSE, THROAT/MOUTH PREPARATIONS

A. CLASSIFICATION: EYE PREPARATIONS

DRUG EXAMPLES:

Anti-infectives:

ciprofloxacin hydrochloride (Ciloxan®)
gentamicin sulfate (Garamycin®)
tobramycin (Tobradex®)
erythromycin (Ilotycin®)

Anti-inflammatory Agents:

dexamethasone sodium phosphate (Decadron Phosphate ophthalmic®)
diclofenac sodium (Voltaren Ophthalmic®)

Miotics/Glucoma agents:

dorzolamide hydrochloride (Trusopt®)
levobunolol hydrochloride (Betagan®)
pilocarpine hydrochloride (Isopto Carpine®)
timolol maleate (Timoptic®)

Mydriatics:

atropine sulfate (Isopto Atropine®)
phenylephrine hydrochloride (Neo-Synephrine®)
scopolamine hydrobromide (Isopto Hyosine®)

Ophthalmic Antihistamines

Olopatadine (Patanol®)

Ophthalmic Vasoconstrictors:

Naphazoline hydrochloride (Clear Eyes®)
tetrahydrozoline hydrochloride (Visine®)

Topical Ophthalmic Anesthetics:

proparacaine hydrochloride

Artificial Tears:

tetrahydrozoline hydrochloride (Lacril®, Ultra Tears®)

Miscellaneous Ophthalmics:

sodium chloride hypertonic (Ophthalmic Solution)

INDICATIONS:

Anti-infectives: are used to treat eye infections.

Anti-inflammatory Agents: are used to treat swelling of the eyes,

allergic reactions in the eye, and foreign bodies.

Miotics are used to treat open-angle glaucoma by decreasing intraocular pressure; they **constrict** the pupils.

Mydriatics are used in acute inflammation of the iris and diagnostic procedures; they **dilate** the pupils.

Ophthalmic Vasoconstrictors: are used to treat ocular congestion, irritation, and redness.

Artificial Tears are instilled in the eye to lubricate, remove debris, and protect against infection when tear production is insufficient.

Topical Ophthalmic Anesthetics: are used to anesthetize the eyes during a procedure that requires no eye movement or to deaden the pain.

SIDE EFFECTS/ADVERSE REACTIONS:

Miotics:

CNS:	Headaches
CV:	Hypotension, bradycardia, arrhythmias, palpitations
EENT:	Blurred vision, eye or brow pain
GU:	Frequent urination
SKIN:	Sweating, flushing, contact dermatitis
OTHER:	Muscle weakness, cramps

Mydriatics:

CNS:	Confusion
CV:	Hypertension, tachycardia
EENT:	Increased intraocular pressure, conjunctivitis, blurred vision, eye dryness, initial burning of eye when instilled
SKIN:	Flushing, dry skin

Artificial Tears:

EENT:	Eye discomfort, burning, blurred vision, crust formation
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NURSING IMPLICATIONS:

ADMINISTER:

1. Be sure the preparation is for **“OPHTHALMIC USE.”** Read the directions.
2. **DO NOT** touch the tip of the medication dropper or tube to the eye.
3. Place eye drops in the conjunctival sac in the lower lid.

TEACH:

1. **Mydriatics:** avoid driving or operating heavy machinery until temporary blurring subsides. Dark glasses should be worn to decrease photosensitivity.
2. **Topical Ophthalmic Anesthetics:** **NOT** to rub or touch eyes while the cornea is anesthetized to prevent corneal abrasions.
3. Correct way to administer eye preparations to self.

UNIT I, SECTION 8: EYE, EAR, NOSE, THROAT/MOUTH PREPARATIONS

B. CLASSIFICATION: EAR PREPARATIONS

DRUG EXAMPLES:

Anti-infectives:

acetic acid
boric acid (Ear-Dry®)
cipro HC solution /erythromycin solution
ofloxacin (Floxin®)

Anti-inflammatory Agents:

dexamethasone sodium phosphate (Decadron®)

Wax Softener:

carbamide peroxide (Debrox®)
triethanolamine polypeptide oleate-condensate (Cerumenex®)

Analgesics:

benzocaine (Auralgan®)

INDICATIONS:

Anti-infectives are used to destroy or inhibit bacteria in the ear. Boric acid will also act as an anti-fungal agent.

Anti-inflammatory Agents are used to control inflammation, edema, and itching in the ear.

Wax Softeners are used to emulsify and disperse accumulated wax in the ear.

Analgesics are used to relieve pain.

SIDE EFFECTS/ADVERSE REACTIONS:

EENT: Itching, ear irritation, overgrowth of nonsusceptible organisms.

OTHER: Masking of underlying infection (Anti-inflammatory Agents)

NURSING IMPLICATIONS:

ADMINISTER:

1. **BE SURE THE MEDICATION SAYS FOR "OTIC USE."**
2. To open the ear canal on an adult, pull up and back on the adult's ear lobe and down and forward on a child's ear lobe.
3. Cleanse the ear before instilling drops. Instill drops by allowing the drops to trickle down the external ear canal. **DO NOT** occlude the canal with the dropper.

TEACH:

1. To call the medical provider if ear pain lasts more than 48 hours.

2. Correct way to administer ear preparations to self.

UNIT I, SECTION 8: EYE, EAR, NOSE, THROAT/MOUTH PREPARATIONS

C. CLASSIFICATION: NOSE PREPARATIONS

DRUG EXAMPLES:

Azelastine hydrochloride (Astelin nasal®)
beclomethasone dipropionate (Beconase AQ®)
budesonide (Rhinocort Aqua®)
fluticasone propionate (Flonase®)
ipratropium bromide (Atrovent nasal®)
oxymetazoline hydrochloride (Afrin®)
phenylephrine hydrochloride (Neosynephrine®)
triamcinolone acetonide (Nasacort AQ®)

INDICATIONS:

Nose preparations are used to relieve nasal congestion.

SIDE EFFECTS/ADVERSE REACTIONS:

CNS: Headache, nervousness
CV: Tachycardia, palpitations
EENT: Rebound nasal congestion, mucosal irritation/bleeding, nasal dryness
OTHER: Hypersensitivity

NURSING IMPLICATIONS:

ASSESS:

1. For nasal bleeding.
2. For palpitation, rebound congestion, swelling of the mucosa, and signs of prolonged use overuse.

ADMINISTER:

1. To instill nose drops, place the patient/client on his/her back with shoulders elevated and head tilted back.
2. **DO NOT** contaminate the dropper by touching it to the nostril.
3. Rinse the tip of the spray tube in hot water after each use to prevent contamination from nasal secretions.
4. Nasal passages should be cleared before nose drops are instilled.

TEACH:

1. Caution against overuse of nasal preparations. Use for prolonged periods or use of excessive dosages can result in swelling of the nasal mucosa, palpitation, rebound congestion and bleeding.
2. Proper way to administer nasal preparations to self.
3. Saline nasal spray and other moisturizing techniques may help prevent excessive drying.

UNIT I, SECTION 8: EYE, EAR, NOSE, THROAT/MOUTH PREPARATIONS

D. CLASSIFICATION: THROAT/MOUTH PREPARATIONS

DRUG EXAMPLES:

benzocaine (Oral-jel®, Spec-T®, Trocaine®)
lidocaine hydrochloride (Xylocaine®)
nystatin (Mycostatin®)
triamcinolone acetonide (Kenalog®, Astrocort® in topical preparation)

INDICATIONS:

These drugs may be used alone or with other drugs to treat conditions of the mouth.

lidocaine hydrochloride (Xylocaine®) is used for dental anesthesia.

SIDE EFFECTS/ADVERSE REACTIONS:

benzocaine (Oral-jel®):

OTHER: Hypersensitivity, possible tolerance

lidocaine hydrochloride (Xylocaine®):

CNS: Seizure, respiratory arrest

CV: Arrhythmias, cardiac arrest

OTHER: Anaphylactic shock, status asthmaticus

nystatin (Mycostatin®):

CNS: Neuromuscular blockade

EENT: Ototoxicity

GU: Nephrotoxicity

Skin: Rash, contact dermatitis

triamcinolone acetonide (Kenalog® in topical preparation):

CNS: Seizures, euphoria

CV: Heart failure, arrhythmias,

METAB: With continued use may develop adrenal insufficiency, altered glucose metabolism, and activation of a peptic ulcer.

OTHER: Interference with pharyngeal stage of swallowing, hypersensitivity

NURSING IMPLICATIONS:

ADMINISTER:

Provide good oral hygiene.

TEACH:

1. Importance of good mouth care.

2. **lidocaine hydrochloride (Xylocaine®):**
 - a. used cautiously with patients/clients who have cardiac disease, hyperthyroidism, or severe nasal or oral sepsis.
 - b. **NOT** to drink or eat for 60 minutes after oral application of these drugs to avoid aspiration.
3. **triamcinolone acetonide (Kenalog® in topical preparation):**
 - a. used cautiously with patients/clients with diabetes, peptic ulcers, or tuberculosis to prevent systemic absorption.
 - b. applied after meals and at bedtime.

UNIT I, SECTION 9: GASTROINTESTINAL SYSTEM DRUGS

A. CLASSIFICATION: ANTACIDS and ANTIFLATULENTS

DRUG EXAMPLES:

aluminum hydroxide (Amphojel®)
calcium carbonate (Tums®, Roloids®)
magaldrate (Riopan®)
magnesia magma - MOM - magnesium hydroxide (Milk of Magnesia®)
simethicone (Mylicon®, Phazyme®)
Combination Drugs (Di-Gel®, Gelusil®, Maalox Plus®, Mylanta®)

INDICATIONS:

Antacids reduce total acid load in the GI tract and help to control ulcer pain. They are also used to treat retro-sternal burning sensation (heartburn) due to reflux esophagitis.

SIDE EFFECTS/ADVERSE REACTIONS:

GI: Gastric distention, flatulence, acid rebound, intestinal obstruction, constipation (those with aluminum or calcium), diarrhea (those with magnesium)

NURSING IMPLICATIONS:

ASSESS:

1. Patient/individual on restricted sodium diet since some of these drugs are high in sodium and may cause fluid retention.
2. **Aluminum** and **calcium** containing drugs may cause constipation and **magnesium** containing drugs may cause diarrhea.

ADMINISTER:

1. Give with small amounts of water to transport medication to the stomach.
2. Usually give these drugs 30 minutes to 1 hour after meals.
3. **DO NOT** give these drugs within 1 hour of other drugs unless specifically instructed to do so by the medical provider/pharmacist since they inhibit the absorption of other drugs.

TEACH:

DO NOT to take these drugs at the same time as other drugs unless instructed otherwise by the medical provider.

UNIT I, SECTION 9: GASTROINTESTINAL SYSTEM DRUGS

B. CLASSIFICATION: ANTISPASMODICS (GASTROINTESTINAL ANTICHOLINERGICS)

DRUG EXAMPLES:

belladonna alkaloids/leaf propantheline bromide (Pro-Banthine®)
loperamide (Imodium®)
Combination Drugs (Donnatal®)

INDICATIONS:

These drugs are used to treat gastrointestinal spasms by inhibiting GI smooth muscle contraction and delaying gastric emptying.

SIDE EFFECTS/ADVERSE REACTIONS:

CNS: Headache, insomnia, drowsiness, dizziness, confusion, or excitement in the elderly
CV: Tachycardia, palpitations
EENT: Increased sensitivity to light, blurred vision
GI: Dry mouth, constipation
GU: Urinary hesitance and retention
SKIN: Rash, urticaria, decreased sweating
OTHER: Allergic reactions, overdose may cause Curare-like symptoms (paralysis)

NURSING IMPLICATIONS:

ASSESS:

1. Be careful that the patient/individual does not become overheated; increased risk of heat stroke.
2. Intake and output.
3. Vital signs (particularly pulse) and for gastrointestinal (GI) complaints.

ADMINISTER:

1. Give 30 minutes to 1 hour before meals or at bedtime.
2. For missed dose: take as scheduled at the next dosing time, **DO NOT** double up on dose.
3. **DO NOT** give these drugs with Antacids. Alternate dosage times.
4. Offer 3-10 glasses of fluid per day to prevent constipation.

TEACH:

1. Warn about driving and other activities that require alertness.
2. To avoid alcohol and becoming overheated.
3. To wear sun glasses when outside.
4. **NOT** to double up on a missed dose.
5. To drink adequate fluids and to report decreased urinary output.

UNIT I, SECTION 9: GASTROINTESTINAL SYSTEM DRUGS

C. CLASSIFICATION: ANTIDIARRHEALS

DRUG EXAMPLES:

bismuth subsalicylate (Pepto-Bismol®)
diphenoxylate hydrochloride with atropine sulfate (Lomotil®)
donnatal PG (with Paragoric)
kaolin and pectin mixtures (Kaopectate®)
lactobacillus (Bacid®, Lactinex®)
loperamide (Imodium®)
opium tincture, camphorated (Paregoric®)
Combination Drug (Donnagel®)

INDICATIONS:

These drugs are used to control diarrhea.

SIDE EFFECTS/ADVERSE REACTIONS:

CNS: Sedation, drowsiness, dizziness

GI: Constipation, increased flatus, dry mouth, temporary darkening of stools and tongue (**bismuth subsalicylate [Pepto-Bismol®]**)

NURSING IMPLICATIONS:

ASSESS:

1. For problems with addiction as some of these medications are controlled substances (e.g., Opium Tincture-camphorated [Paregoric®]).
2. For cause of acute diarrhea. These drugs are contraindicated when cause is poisoning (until it has been identified) or with suspected bowel lesions.
3. **bismuth subsalicylate (Pepto-Bismol®):** for problems associated with salicylates such as bleeding or Reye's Syndrome with children who have viral infections since **bismuth subsalicylate (Pepto-Bismol®)** contains large amounts of salicylate.

ADMINISTER:

1. Liquid forms may reduce the absorption of other drugs taken by mouth.
2. These drugs are usually not administered for more than 2 days at a time.
3. Store **lactobacillus (Bacid®)** in the refrigerator.

TEACH:

Contact the medical provider if still having symptoms after 2 days.

UNIT I, SECTION 9: GASTROINTESTINAL SYSTEM DRUGS

D. CLASSIFICATION: CATHARTICS (LAXATIVES / STOOL SOFTENERS)

DRUG EXAMPLES:

Bulk-Forming Laxative:

psyllium (Metamucil®)

Osmotic Agent:

lactulose (Chronulac®)

polyethylene glycol (Miralax®)

polyethylene glycol and electrolyte solution (CoLyte®, GoLyteLy®)

sodium phosphates (Fleet Enema®)

Lubricant Laxatives:

mineral oil

glycerin (Fleet BabyLax®)

Saline Laxatives:

fleets enema

magnesium citrate (Citroma®)

milk of magnesium (MOM®)

senna (Senokot®)

Stimulant Laxatives:

bisacodyl (Dulcolax®)

cascara sagrada

castor oil

Stool Softener:

docusate sodium (Colace®)

Combination Drug:

docusate salts and casanthranol (Peri-Colace®)

INDICATIONS:

These drugs are used to relieve or prevent constipation and may be used to soften stools and prevent straining during defecation.

SIDE EFFECTS/ADVERSE REACTIONS:

GI: Dehydration, diarrhea, nausea, abdominal cramps, irritation of the colon, laxative dependence, loss of normal bowel function with excess use

RESP: Lipid pneumonia (with Lubricants - Mineral Oil)

NURSING IMPLICATIONS:

ASSESS:

1. These drugs are contraindicated when there are symptoms of appendicitis (e.g., abdominal pain, nausea, vomiting).
2. **lactulose (Chronulac®):** used cautiously with diabetics.

ADMINISTER:

1. Tablets and suppositories should be stored at a temperature below 86 degrees F (30 degree C).
2. Shake suspensions well.
3. **Mineral Oil and Castor Oil:** mix in juice to disguise the taste.
4. **psyllium (Metamucil®) and polyethylene glycol (Miralax®):** must be mixed with 8 oz. of water, juice, soda, coffee or tea, stirred only a few seconds, and drunk immediately to prevent solidification. An additional glass of liquid should be given.
5. **bisacodyl (Dulcolax®):** should be swallowed whole and **NOT** given with milk or Antacids.

TEACH:

1. To drink plenty of fluids, particularly those on stool softeners, and to eat foods high in fiber.
2. Caution about the longterm use of laxatives which may lead to dependence, colon irritation, and severe diarrhea.

UNIT I, SECTION 9: GASTROINTESTINAL SYSTEM DRUGS

E. CLASSIFICATION: EMETICS

DRUG EXAMPLES:

ipecac syrup

INDICATIONS:

This drug is used to induce vomiting in cases of acute poisoning when it is necessary and desirable to empty the stomach promptly and completely.

SIDE EFFECTS/ADVERSE REACTIONS:

CV: Cardiac disturbances (e.g., atrial fibrillation, fatal myocarditis) can be caused if the drug does not cause vomiting within 30 minutes of being absorbed.

NURSING IMPLICATIONS:

ASSESS:

1. **DO NOT** give this drug to a patient/individual who is comatose.
2. **DO NOT** give this drug if the patient/individual has ingested a highly corrosive substance like lye, strong acid, or petroleum distillate like kerosene.

ADMINISTER:

1. Follow the administration of this drug with 200-300 cc's of water.
2. Call the Poison Control Center in any poisoning situation for recommendations regarding treatment.

UNIT I, SECTION 9: GASTROINTESTINAL SYSTEM DRUGS

F. CLASSIFICATION: ANTIEMETICS

DRUG EXAMPLES:

dimenhydrinate (Dramamine®)
meclizine hydrochloride (Antivert®, Bonine®)
metoclopramide hydrochloride (Reglan®)
ondansetron hydrochloride (Zofran®)
prochlorperazine maleate (Compazine®)
promethazine hydrochloride (Phenergan®)
scopolamine (Transderm-Scop Patches®)
trimethobenzamide hydrochloride (Tigan®)

INDICATIONS:

These drugs are used to control nausea and vomiting. They are indicated whenever vomiting is severe enough to produce significant fluid, electrolyte and nutrient losses.

metoclopramide hydrochloride (Reglan®) is also indicated for GERD.

SIDE EFFECTS/ADVERSE REACTIONS:

CNS: Tardive dyskinesia, akathisia, altered temperature regulation, drowsiness, extrapyramidal symptoms (**prochlorperazine maleate [Compazine®], metoclopramide hydrochloride [Reglan®]**)

CV: Sudden rise or fall in blood pressure

EENT: Blurred vision, dry mouth

GU: Urinary retention, dark urine

NURSING IMPLICATIONS:

ASSESS:

Blood pressure.

ADMINISTER:

1. Give IM injections in large muscle mass.
2. **scopolamine (Transderm-Scop Patches®):** apply to dry skin area behind the ear 2-3 hours before experiencing motion. Should be used cautiously with patients/clients who have glaucoma, pyloric obstruction, or bladder neck obstruction.
3. **promethazine hydrochloride (Phenergan®)** for motion sickness, give 30 minutes before travel time.

TEACH:

Warn about driving and other activities that require alertness.

UNIT I, SECTION 9: GASTROINTESTINAL SYSTEM DRUGS

- G. CLASSIFICATION: ANTI-ULCER AGENTS**
- 1. HISTAMINE RECEPTOR ANTAGONIST**
 - 2. GASTRIC ACID PUMP INHIBITOR**

DRUG EXAMPLES:

Histamine Receptor Antagonist: decrease gastric acid

cimetidine (Tagamet®)
famotidine (Pepcid®)
ranitidine hydrochloride (Zantac®)

Proton Pump Inhibitor: suppress gastric acid

omeprazole (Prilosec®, Zegerid®)
esomeprazole magnesium (Nexium®)
iansoprazole (Prevacid®)
rabeprazole sodium (Aciphex®)
pantoprazole sodium (Protonix®)

Sucralfate (Carafate®)

INDICATIONS:

These drugs decrease gastric acid secretions, used to treat ulcers in the GI tract, and GERD (Gastro Esophageal Reflux Disease).

SIDE EFFECTS/ADVERSE REACTIONS:

- BLOOD:** Blood dyscrasias
- CNS:** Headaches (especially with **ranitidine hydrochloride [Zantac®]**), mental confusion and dizziness (particularly with the elderly), depression (with **cimetidine [Tagamet®]**)
- GI:** Diarrhea, constipation, and nausea
- OTHER:** Painfully enlarged male breasts may occur after more than 1 month's use of Classification 1 drugs

NURSING IMPLICATIONS:

ASSESS:

- For healing: healing usually begins within the first week of therapy, so length of treatment is usually short. Maintenance treatment for more than 12 months is **NOT** recommended except when treating patients/individuals who have chronic reflux or a history of GI bleeding.
- cimetidine (Tagamet®):**
 - the dose should be reduced with the elderly to prevent **cimetidine (Tagamet®)** induced mental confusion.
 - DO NOT** administer to children under 16 unless the anticipated

benefits outweigh the potential risks.

ADMINISTER:

1. **cimetidine (Tagamet®):** give with or right after meals. **DO NOT** give with benzodiazepines due to sedation.
2. **famotidine (Pepcid®)** and **ranitidine hydrochloride (Zantac®):** give at bedtime.
3. **omeprazole (Prilosec®)** should be administered before meals. Ideally, capsules **SHOULD NOT** be opened, chewed or crushed. If necessary, capsule can be opened and mixed with applesauce or in a small amount of orange juice.
4. **esomeprazole magnesium (Nexium®):** take one hour before meal.
5. Iron salts may affect absorption if given with **iansoprazole (Prevacid®)** or **pantoprazole sodium (Protonix®)**

UNIT I, SECTION 9: GASTROINTESTINAL SYSTEM DRUGS

H. CLASSIFICATION: DIGESTANTS

DRUG EXAMPLES:

lactose enzyme (Lactacid®)

pancrelipase (Cotazym®)

scharomyces (Florastor®)

INDICATIONS:

These drugs are used to replace or supplement one of the enzymes or other chemical substances that aid in digestion of food.

SIDE EFFECTS/ADVERSE REACTIONS:

GI: Nausea, vomiting, anorexia, diarrhea with high doses

NURSING IMPLICATIONS:

ADMINISTER:

1. Swallow tablets without chewing them.
2. These drugs should be administered at the beginning of the meal.

UNIT I, SECTION 10: HORMONES AND SYNTHETIC SUBSTITUTES

A. CLASSIFICATION: PITUITARY HORMONES

DRUG EXAMPLES:

corticotropin (ACTH®, Acthar®)	Growth Hormone:
desmopressin acetate (DDAVP®)	somatotropin (Humatrope®)
lypressin (Diapid®)	somatrem (Protropin®)
vasopressin (Pitressin®)	

INDICATIONS:

vasopressin (Pitressin®), desmopressin (DDAVP®) and lypressin (Diapid®) are used to combat symptoms of diabetes insipidus and bedwetting (**desmopressin acetate [DDAVP®]** in the nasal preparation).

corticotropin (ACTH®) acts as a screening agent for primary adrenal insufficiency.

Growth Hormone (somatotropin [Humatrope®] and somatrem [Protropin®]) are used to treat growth impairment due to growth hormone insufficiency.

desmopressin acetate (DDAVP®) in the nasal preparation, is used to treat enuresis (bedwetting) in children.

SIDE EFFECTS/ADVERSE REACTIONS:

vasopressin (Pitressin®), desmopressin acetate (DDAVP®) and lypressin (Diapid®):

CNS:	Headache, drowsiness
CV:	Hypertension
EENT:	Rhinitis, wheezing, nasal congestion
F & E:	Water intoxication, hyponatremia
GI:	Nausea, vomiting
RESP:	Dyspnea
SKIN:	Flushing

corticotropin (ACTH®):

CNS:	Depression
CV:	Edema, hypertension
EENT:	Increased intraocular pressure
ENDO:	Decreased growth in children, adrenal suppression
F & E:	Hypokalemia, sodium and fluid retention
GI:	Nausea, vomiting
SKIN:	Petechiae, decreased wound healing
OTHER:	Suppression of the immune system, increased susceptibility to infection

Growth Hormone:

CV: Edema
ENDO: Hyperglycemia, insulin resistance, hypothyroidism
LOCAL: Pain at the injection site

NURSING IMPLICATIONS:

ASSESS:

1. Vital signs, particularly blood pressure; these drugs should be used cautiously with patients/clients who have coronary artery insufficiency or hypertension.
2. Weight, intake and output.
3. For dehydration or water intoxication (drowsiness, headache).
4. **corticotropin (ACTH®):** for signs of infection. This drug is contraindicated where infections are suspected as it may mask disease symptoms (e.g., active tuberculosis, peptic ulcer). It should be used cautiously with patients/individuals who have chronic diseases (e.g., diabetes, congestive heart failure).
5. **Growth Hormone (somatotropin [Humatrope®] or Somatrem [Protropin®]):** regular assessment of bone age progression, height, weight, blood/urine glucose levels and thyroid functioning.

TEACH:

Nasal congestion, allergic rhinitis, or upper respiratory infection may diminish drug absorption of **lypressin (Diapid®)** and **desmopressin (DDAVP®)**

UNIT I, SECTION 10: HORMONES AND SYNTHETIC SUBSTITUTES

B. CLASSIFICATION: GONADAL HORMONES

DRUG EXAMPLES:

Androgens:

danazol (Danocrine®)
fluoxymesterone (Android F®)
testosterone (Andro®, Androlaq®)

Estrogens:

diethylstilbestrol (Stilboestrol®) [DES]
estrogenic substances, conjugated (Premarin®)
estradiol/estradiol, cyplonate/estradiol, valerate/estradiol
transdermal system (Estraderm TTS®)

Progestins:

medroxyprogesterone acetate (Provera®, Depo-Provera®)
norethindrone acetate (Norlutin®)

Oral Contraceptives:

enovid, brevicon, ortho-novum

Other:

levonorgestrel implant (Norplant®)
etonogestrel and estradiol vaginal ring (NuvaRing®)

INDICATIONS:

Androgens are used to combat hypogonadism and to treat some forms of breast cancer and gynecological conditions such as endometriosis. They may be misused and are therefore now classified as controlled substances.

Estrogens are used to treat menopausal symptoms, breast and prostatic cancer, postmenopausal osteoporosis, and various estrogen deficiency states.

Progestins are used to relieve dysfunctional uterine bleeding and to treat amenorrhea and endometriosis.

Oral contraceptives are used to prevent pregnancy and regulate menses.

SIDE EFFECTS/ADVERSE REACTIONS:

Androgens:

CNS: Emotional lability

CV: Edema

EENT: Deepening of the voice

ENDO: Decreased breast size; anovulation; amenorrhea; clitoral enlargement in females; impotence, priapism, gynecomastia in males

METAB: Weight gain
SKIN: Acne, oily skin, hirsutism
OTHER: Pain at injection sites

Estrogens:

CNS: Headache, dizziness
CV: Edema, thromboembolism, hypertension, heart attack
EENT: Intolerance to contact lenses
ENDO: Breakthrough bleeding, dysmenorrhea, amenorrhea, breast tenderness in females, testicular atrophy and gynecomastia in males
GI: Nausea
METAB: Weight gain
SKIN: Acne, oily skin

Progestins:

CNS: Depression
CV: Thromboembolism, pulmonary embolism, edema
ENDO: Breakthrough bleeding, breast tenderness
GI: Gingival bleeding
METAB: Rashes, pigmentation
OTHER: Allergic reactions

Contraceptives:

CNS: Headaches, depression
CV: Edema, stroke, elevated blood pressure, phlebitis, embolism
EENT: Intolerance to contact lenses
ENDO: Menstrual irregularities, breast tenderness
METAB: Weight gain
SKIN: Pigmentation changes, dermatitis

NURSING IMPLICATIONS:

ASSESS:

1. **Estrogens, Progestins, and Oral Contraceptives:**
 - a. Are contraindicated for those with thrombophlebitis or thromboembolic disorders.
 - b. Used cautiously with those who have heart disease, history of genital or breast cancer, diabetes, renal disease, or psychosis.
 - c. Vital signs, particularly blood pressure; blood/urine glucose levels; weigh regularly.

2. **levonorgestrel implant (Norplant®):** for jaundice and thrombophlebitis.

ADMINISTER:

1. **levonorgestrel implant (Norplant®)** should be implanted 3 inches above the crease of the elbow 7 days after onset of menses.
2. Give IM injections deeply in large muscle.
3. Estrogen transdermal: apply to trunk twice a week.
4. **etonogestrel and ethinyl estradiol vaginal ring (NuvaRing®)** should remain in place continuously for 3 full weeks to maintain efficacy. It is then removed for one week and a new ring inserted one week after removal of the previous one.

TEACH:

1. To report symptoms such as edema, enlarged breasts, headache, weight gain of more than 5 pounds, tarry stools.
2. That complications with oral contraceptives may occur more frequently in women who smoke.
3. **That antibiotics may alter the contraceptive effect of oral contraceptives; other methods of birth control should be used.**
4. What to do in the event of missed dose(s) of oral contraceptives.
5. Importance of getting regular pap smears while on estrogen therapy.
6. **levonorgestrel implants (Norplant®):**
 - a. To report sudden vision changes.
 - b. That some drugs used for seizures such as **carbamazepine (Tegretol®)** and **phenytoin (Dilantin®)** or for TB such as **rifampin (Rifadin®)** are negatively affected.
 - c. That irregular bleeding can be heavy.
7. **Androgens:** are controlled substances with increased risk of abuse. They may cause aggressive behavior.
8. Should be stopped during periods of inactivity (bedrest, etc.) to prevent thromboembolism.

UNIT I, SECTION 10: HORMONES AND SYNTHETIC SUBSTITUTES

C. CLASSIFICATION: THYROID HORMONES

DRUG EXAMPLES:

levothyroxine sodium (T4 [Synthroid®, Levothroid®])
liothyronine sodium T3 (Cytomel®)
liotrix (Euthroid®, Thyrolar®)
thyroglobulin (Proloid®)
thyroid, dessicated (Thyroid®, USP®)
thyrotropin (Thytropar®)

INDICATION:

Thyroid hormones are used to treat hypothyroidism.

SIDE EFFECTS/ADVERSE REACTIONS:

CNS: Irritability, nervousness, insomnia, headache
CV: Tachycardia, arrhythmias, hypertension, angina
ENDO: Menstrual irregularities
GI: Diarrhea, cramps, vomiting
METAB: Weight loss (may be desirable, depending on the degree), heat intolerance

NURSING IMPLICATIONS:

ASSESS:

1. For signs of hyperthyroidism (e.g., chest pain, palpitations, nervousness, sweating). These could be the result of toxicity.
2. These drugs are contraindicated for patients/clients with myocardial infarction, uncorrected adrenal insufficiency, or thyrotoxicosis.
3. For therapeutic response by observing for increased mental alertness and energy level, and weight loss.
4. Thyroid function tests.
5. Blood pressure and pulse before giving: if pulse over 100, **DO NOT** give the drug and report to the RN/medical provider.

ADMINISTER:

Give at least 4-5 hours apart from **cholestyramine (Questran®)** which inhibits thyroid absorption.

TEACH:

1. How to take a pulse and to report if over 90 or irregular.
2. To take the drug at the same time each day to maintain a constant drug level.
3. These drugs are potentially dangerous and are **NOT** indicated for vague symptoms of sluggishness or obesity.

UNIT I, SECTION 10: HORMONES AND SYNTHETIC SUBSTITUTSS

D. CLASSIFICATION: ANTITHYROID DRUGS

DRUG EXAMPLES:

methimazole (Tapazole®)
potassium iodide (Lugol's Solution®)
propylthiouracil PTU (Propyl-Thyracil®)

INDICATIONS:

These drugs are used to treat hyperthyroidism.

SIDE EFFECTS/ADVERSE REACTIONS:

methimazole (Tapazole®), propylthiouracil PTU (Propyl-Thyracil®):

CNS: Headache, drowsiness
EENT: Salivary gland enlargement
GI: Nausea, vomiting, loss of taste, diarrhea
HEMAT: Agranulocytosis, leukopenia
MS: Arthralgia
SKIN: Rash, skin discoloration

potassium iodide (Lugol's Solution®):

EENT: Inflammation of salivary glands
GI: Gastric irritation, metallic taste, diarrhea
SKIN: Rash, acneform eruptions
OTHER: Hypersensitivity

NURSING IMPLICATIONS:

ASSESS:

1. For signs of agranulocytosis (i.e., sore throat, rash, fever, nosebleed).
2. For signs of hypothyroidism (e.g., mental depression, cold intolerance, hard nonpitting edema) and hyperthyroidism (e.g., not sleeping, increased blood pressure, irritability).
3. Monitor for therapeutic response by taking daily pulse rates. Monitor for decreased pulse rate.
4. Thyroid function tests should be monitored.
5. Use cautiously during pregnancy.

ADMINISTER:

1. Give these drugs with or after meals to prevent gastric irritation.
2. Store these drugs in light resistant containers.
3. **potassium iodide (Lugol's Solution®):**
 - a. Dilute oral doses in water, milk, or fruit juices and give with meals.
 - b. Give with a straw to avoid tooth discoloration.

TEACH:

1. These drugs must be taken regularly, exactly as directed or hyperthyroidism may occur. Warn the patient/individual about abrupt discontinuation of these drugs.
2. Caution about eating foods high in iodine (e.g., shell fish, iodized salt) while taking these drugs.
3. Use with Lithium may intensify the antithyroid effect.
4. How to take a pulse and to report pulse levels below 60.

UNIT I, SECTION 10: HORMONES AND SYNTHETIC SUBSTITUTES

E. CLASSIFICATION: ANTIDIABETIC AGENTS: ORAL HYPOGLYCEMIC AGENTS

DRUG EXAMPLES:

acetohexamide (Dymelor®)
chlorpropamide (Diabinese®)
glipizide (Glucotrol®)
glyburide (DiaBeta®)
tolazamide (Tolinase®)
tolbutamide (Orinase®)
metformin hydrochloride (Glucophage®)
pioglitazone hydrochloride (Actos®)
rosiglitazone (Avandia®)

INDICATIONS:

Are used to treat stable, adult onset, non-insulin dependent diabetes mellitus and when diet therapy fails to control blood sugar or symptoms. They stimulate the pancreas to produce additional insulin and increase the responsiveness of insulin receptor sensitivity.

SIDE EFFECTS/ADVERSE REACTIONS:

CNS: Headache, drowsiness
ENDO: Hypoglycemia
GI: Nausea, vomiting, heartburn, diarrhea
HEMAT: Blood dyscrasias
SKIN: Rashes, itching, photosensitivity
OTHER: Hypersensitivity reactions

ASSESS:

1. These drugs are contraindicated for severe diabetes (insulin dependent) or when ketosis is present.
2. Vital signs (particularly blood pressure and pulse).
3. Blood sugar levels.
4. For symptoms of hypo- and hyper-glycemia when changing from one antidiabetic agent to another.
5. **chlorpropamide (Diabinese®)** is contraindicated in use with geriatric patients/individuals.
6. Monitor for drug interactions such as decreased effectiveness when given with certain drugs (e.g., calcium channel blockers, corticosteroids, etc.), and increased hypoglycemic effect when given with certain drugs (e.g., oral anticoagulants, NSAIDS, cimetidine [Tagamet®], salicylates).

TEACH:

1. About diabetes and precautions that should be taken as well as the importance of adhering to a therapeutic regimen.
2. Symptoms of hypo- and hyperglycemia.
3. How and when to test for ketonuria and serum glucose.
4. To take medication as ordered and to avoid over-the-counter (OTC) drugs unless ordered by the medical provider.
5. Have a Medic Alert ID.
6. Some patients/individuals may take a combination of oral agents and insulin preparations.

UNIT I, SECTION 10: HORMONES AND SYNTHETIC SUBSTITUTES

F. CLASSIFICATION: ANTIDIABETIC AGENTS: INSULIN

DRUG EXAMPLES:

Ultra Rapid Acting:

lispro (Humalog®)	Onset: 15-30 minutes
	Peak: 30-90 minutes
	Duration: less than 6 hours
insulin inhalation powder (Exubera®)	Onset: 10-20 minutes
	Peak: 2 hours
	Duration: 6 hours

Rapid acting:

regular (Humulin R®, Novolin R®)	Onset : 1/2-1 hour
regular concentrated (Iletin II 500®)	Peak: 2-3 hours
semilente	Duration: 5-8 hours

Intermediate Acting:

NPH (Humulin N®, Novolin N®)	Onset: 1-2 hours
lente	Peak: 7-12 hours
	Duration: 24-30 hours

Long Acting:

ultralente	Onset: 4-8 hours
lantus	Peak: 12-24 hours
	Duration: 30-36 hours

Insulin Mixtures:

humulin 70/30
novolin 70/30
humulin 50/50

Onset, peak, and duration times will vary depending on the size and activity level of the patient/individual.

INDICATIONS:

These agents are given to supply insulin for patients/individuals with diabetes mellitus.

SIDE EFFECTS/ADVERSE REACTIONS:

ENDO: **Hypoglycemia:** cool, damp, pale skin; hunger; headache; nervousness; weakness; anxiety; rapid pulse; confusion; seizures (severe)

hypoglycemia results in insulin shock)

Hyperglycemia: dry flushed skin, fruity breath, vomiting, increased respirations, drowsiness, frequent urination, thirst, confusion, staggering gait, double vision, coma (severe hyperglycemia results in diabetic coma)

LOCAL: Lipodystrophy, lipohypertrophy

SKIN: Urticaria, redness, swelling at the injection site

OTHER: Allergic reaction, anaphylaxis

NURSING IMPLICATIONS:

ASSESS:

1. Blood sugar levels and for ketones, as ordered.
2. For symptoms of hypo- and hyperglycemia.
3. For skin lesions.

ADMINISTER:

1. Store insulin in a cool, dry place.
2. **ALWAYS** check expiration date on the insulin vial.
3. Roll the vial gently between palms to mix. **DO NOT** shake.
4. Use a calibrated insulin syringe to accurately measure the dose. Have another nurse check the insulin preparation prior to administration to insure the accuracy of the dose (per facility policy).
5. Rotate the injection sites to prevent atrophy and hypertrophy of the subcutaneous tissue. **DO NOT GIVE IN THE SAME INJECTION POINT WITHIN A SITE MORE FREQUENTLY THAN ONCE A MONTH.**
7. **DO NOT** massage the injection site as this may inhibit absorption.
8. Give insulin at the same time every day.
9. Insulin may be administered via insulin pump. Review the correct use of the pump prior to administration.
10. Have carbohydrates available for emergency use in the event of hypoglycemia (orange juice, candy, lump sugar, etc.).

TEACH:

1. About diabetes, injections, and signs and symptoms of hypo- and hyperglycemia.
2. How and when to test for ketonuria and serum glucose.
3. To wear a medical alert bracelet to identify that he/she is a diabetic.

SPECIAL NOTE:

***Lantus is a clear long acting insulin. It should be administered once daily at the same time every day. It should not be mixed or diluted with any other insulin or solution. It is not to be administered intravenously.**

***Only Regular Insulin may be given by intravenous route.**

UNIT I, SECTION 11: VITAMINS, MINERALS, AND ELECTROLYTES

A. CLASSIFICATION: VITAMINS

DRUG EXAMPLES:

Fat Soluble:

vitamin A (Retinol®)
vitamin D - Ergocalciferol (D₂), Cholecalciferol (D₃)
vitamin E
vitamin K - Phytonadione (K₁), Menadione/Menadiol Sodium diphosphate (Vitamin K₃)

Water Soluble:

vitamin B₁ - Thiamine Hydrochloride
vitamin B₂ - Riboflavin
vitamin B₃ - Niacin, Nicotinic Acid, Niacinamide
vitamin B₆ - Pyridoxine Hydrochloride
vitamin B₉ - Folic Acid
vitamin B₁₂ - Cyanocobalamin, Hydroxocobalamin B_{12a})
vitamin C - Ascorbic Acid
pantothenic acid

INDICATIONS:

Vitamins are used to **SUPPLEMENT** diets during periods of increased demands such as pregnancy, to ensure proper growth and development during infancy and childhood, and to compensate for decreased intake and absorption during illness.

SIDE EFFECTS/ADVERSE REACTIONS:

vitamin A (seen only with toxicity): hypoplastic anemia, irritability, headache, lethargy, GI irritation, hypomenorrhea, alopecia, drying and scaling of skin, slow growth, decalcification of bones

vitamin D (seen only with toxicity): headache, ataxia, psychosis, calcification of soft tissue, dry mouth, metallic taste, polyuria, albuminuria, impaired renal function, renal calculi, hypercalcemia, hyperphosphatemia, bone and muscle pain, GI upset

vitamin K: dizziness, convulsive movement, transient hypotension after IV administration, nausea/vomiting, sweating, bronchospasms, dyspnea, increased prothrombin time

vitamin B₁: restlessness, feeling of warmth, pruritus, nausea, sweating, diarrhea, tightness of the throat, cyanosis, weakness, pulmonary edema

vitamin B₂: bright yellow urine in high doses

vitamin B₃: dizziness, transient headache, hyperglycemia, flushing, pruritus, dryness of skin, excessive peripheral vasodilation, cardiac arrhythmias

vitamin B₆: drowsiness, paresthesias

vitamin B₉: allergic skin reactions and bronchospasms, general malaise

vitamin B₁₂: peripheral vascular thrombosis, transient diarrhea, itching, pain from injection, anaphylaxis

vitamin C: faintness, diarrhea, epigastric pain, acid urine, renal stones

NURSING IMPLICATIONS:

ASSESS:

1. Excessive amounts of Vitamin K may interfere with anticoagulant therapy.
2. Dosage range between therapeutic and toxic for Vitamin D is very narrow.
3. Vitamin B₁₂ may mask folate deficiencies.

ADMINISTER:

1. Store vitamins in a cool place in a container resistant to light.
2. **DO NOT** give Mineral Oil and Fat Soluble Vitamins together because the oil will absorb the Vitamin.
3. **AVOID** excessive use of Fat Soluble Vitamins to prevent hyper-vitaminosis.

TEACH:

Stress the need to follow daily allowances and discourage use of megavitamin doses.

UNIT I, SECTION 11: VITAMINS, MINERALS, AND, ELECTROLYTES

B. CLASSIFICATION: MINERALS

DRUG EXAMPLES:

Calcium	<u>Trace Elements:</u>
Chloride	Chromium
Magnesium	Colbalt
Phosphorous	Copper
Potassium	Fluoride
Sodium	Iodine
Sulfur	Iron
	Manganese
	Selenium
	Zinc

INDICATIONS:

Minerals are used to **SUPPLEMENT** dietary deficiencies. Many minerals are essential to enzymes and help regulate many physiological functions.

SIDE EFFECTS/ADVERSE REACTIONS:

Calcium: renal stones, cardiac arrhythmias, GI irritation, hemorrhage, polyuria (overdose symptoms)

Magnesium: flushing, sweating, extreme thirst, decreased blood pressure, cardiac arrhythmias, heart block, cold skin (overdose symptoms)

Potassium: numbness in extremities, listlessness, mental confusion, decreased blood pressure, cardiac arrhythmias, heart block, cold skin (overdose symptoms)

Sodium: edema, congestive heart failure, kidney disease

Sodium Fluoride: mottled, discolored teeth

Zinc Sulfate: GI distress, nausea/vomiting at high doses

NURSING IMPLICATIONS:

TEACH:

1. Absorption of zinc may be hindered by brown bread or dairy products.
2. Routine intake of upper limits of recommended doses of trace elements may be toxic.

UNIT I, SECTION 11: VITAMINS, MINERALS, AND ELECTROLYTES

C. CLASSIFICATION: ELECTROLYTES

DRUG EXAMPLES:

calcium chloride
calcium gluceptate
calcium gluconate
calcium lactate
dextran (Dextran 40®, Gentra 40 LMVD®)
dextrans (Dextran 70 or 75®, Gentran 75®)
hetastarch (Hespan®, Volex®)
magnesium sulfate
potassium acetate
potassium bicarbonate (K-Lyte®)
potassium chloride (K-Lor®)
potassium gluconate (Kaon®)
ringer's lactate
sodium chloride

INDICATIONS:

Electrolytes are used to replace specific anion (negative ion) or cation (positive ion) levels. **dextrans** and **hetastarch** expand volume and replace fluids.

SIDE EFFECTS/ADVERSE REACTIONS:

CNS: Tingling sensation, headache, mental confusion
CV: Cardiac arrhythmias, possible cardiac arrest; EKG changes
(**Potassium Bicarbonate - K-Lyte®**)
GI: Nausea, vomiting, diarrhea
SKIN: Cold, gray skin; urticaria; flushing and sweating
OTHER: Anaphylaxis

NURSING IMPLICATIONS:

ASSESS:

1. For anaphylactic reaction.
2. Electrolyte levels and intake and output.

TEACH:

1. The importance of taking potassium with at least 4 ounces of water/fluid to prevent esophageal/stomach irritation.

UNIT I, SECTION 12: MISCELLANEOUS THERAPEUTIC AGENTS

A. CLASSIFICATION: AGENTS AFFECTING BONE LOSS

DRUG EXAMPLES:

Bisphosphonates:

alendronate sodium (Fosamax®)
etidronate (Didronel®)
ibandronate (Boniva®)
pamidronate Disodium (Aredia®)
rispedronate (Actonel®)
zoledronic acid (Zometa®)

Parathyroid Agents:

calcitonin (Miacalcin®, Salmonine®, Fortical®)
cinacalcet hydrochloride (Sensipar®)
teriparatide (Forteo®)

Vitamin D Analog:

calcitriol (Calcijex®, rocaltrol®)

INDICATIONS:

Bisphosphonates are a family of drugs used to prevent and treat certain types of bone loss (osteoporosis) especially in postmenopausal women.

SIDE EFFECTS/ADVERSE REACTIONS:

CNS: Headache, weakness, dizziness, paresthesia
CV: chest pressure, facial flushing, hypotension **teriparatide (Forteo®)**
EENT: eye pain, nasal congestion, rhinitis, nosebleeds (nasal spray)
GI: Abdominal pain, nausea, dyspepsia, constipation, diarrhea, flatulence, acid regurgitation, esophageal ulceration, vomiting, dysphagia, abdominal distention, gastritis, unusual taste, **osteonecrosis of the jaw (ONJ)**
METAB: hypocalcemia, hypercalcemia
MUSC: arthralgia, leg cramps, neck pain
RESP: dyspnea, increased cough, pneumonia
SKIN: rash, sweating

NURSING IMPLICATIONS:

ASSESS:

1. Patients/individuals ability to comply with strict administration instructions. Must take with full glass of water at least 30 minutes before food, fluids, or other medications. Must be in upright position for at least 30 minutes after taking medication (up right for 60 minutes with **[ibandronate Boniva®]**).

2. Patients/individuals ability to swallow whole pills (cannot hold in mouth, crush, or chew medication). Liquid formulation may be given via enteral tubes.
3. A dental evaluation is recommended prior to starting bisphosphonates to determine the need for possible tooth extractions. Although an extremely rare complication, there have been reports of **Osteonecrosis of the Jaw (ONJ)** following a triggering event, such as a tooth extraction.
4. Monitor for difficulty with swallowing or pain with swallowing.
5. Closely monitor oral health.
6. Orthostatic changes in blood pressure **teriparatide (Forteo®)**.
7. Monitor calcium and Vitamin D levels as ordered.

ADMINISTER:

1. Oral doses should not be held in the mouth, crushed, or chewed.
2. Must be taken on an empty stomach at least 30 minutes before any other medications, fluids, or food are consumed.
3. Oral doses must be followed with a full glass of plain water (6-8 ounces) and the person must remain upright for 30 minutes after medication administration (60 minutes with **ibandronate (boniva®)**).
4. **calcitonin (Miacalcin®)** administered nasally, must alternate nostrils daily.
5. **teriparatide (Forteo®)** administered subcutaneously in the thigh or abdominal wall once daily with a pre-filled pen.

TEACH:

1. Strict administration instructions and importance of compliance.
2. Food or liquids, other than plain water, will cause less of the drug to be absorbed by the body and therefore less effective.
3. To report any problems with swallowing, pain in the throat, or other adverse effects promptly.
4. Aspirin or non-steroidal anti-inflammatory drugs like Ibuprofen or Naproxen may cause or make problems of the esophagus or stomach worse.
5. The importance of having a dental evaluation prior to the start of Bisphosphonates.
6. **calcitonin (Miacalcin®)** administration instructions. Must be stored in a refrigerator at 36°-46° in upright position.
7. **teriparatide (Forteo®)** administration instructions to include proper use and disposal of pre-filled pen. **DO NOT** continue therapy for longer than two years. Must be stored in refrigerator.
8. Manage environment to decrease risk for falls.

UNIT II: NURSING RESPONSIBILITIES IN MEDICATION ADMINISTRATION

OBJECTIVE I: Recognize information about the patient/individual which affects medication administration.

A. **Client/individual Status:**

1. Physical factors which may influence dosage and response:
 - a. **age:** children and elderly patients generally require lower doses and longer drug intervals.
 - b. **weight:** dosage frequently is adjusted to body weight.
 - c. **gender**
 - d. **time of administration:** may affect dosage and drug administration (e.g., before or after meals).
 - e. **route of administration:** generally affects rate of absorption.
 - f. **rate of excretion:** affects a drug's half life, accumulation in the body and frequency of administration.
 - g. **genetic factors:** affects an individual's response to a drug.
 - h. **drug interactions:** effects of a drug may be potentiated or hindered by the prior or concurrent administration of another drug.
 - i. **condition of the patient/individual:** affects drug absorption, dosage, and effectiveness (e.g., underlying diseases).
 - j. **pregnancy:** most drugs are contraindicated.
 - k. **dosage form:** liquids are more readily absorbed.
2. **Socio-psychological factors:** e.g., "person's feelings about taking medications."
 - a. **Based on:**
 - (1.) past experiences with medications: e.g., "I'll have a bad reaction like I did last time."
 - (2.) beliefs about medications: e.g., "It will destroy my sex drive," "It doesn't help me."
 - b. **Feelings expressed verbally and non-verbally:**
 - (1.) medication refusals, frequent requests, etc.
 - (2.) anxiousness, fearfulness, irritation, etc.
 - c. **Implications for nursing:**
 - (1.) listen and validate concerns.
 - (2.) report and document responses.
 - (3.) educate the patient/individual about his/her medications, as appropriate.

B. **Medication History:**

1. **Present or past diseases** of patient/individual and family.
2. **Allergies:** flag according to facility's protocol.
3. **Prescription medications:** past and current.

4. **Non-prescription medications:** over-the-counter drugs, herbal drugs, illegal drugs, and alcohol.
5. **Medication compliance/non-compliance.**
6. **Patient/individual and/or family's knowledge and attitudes** regarding medications.
7. **Any previous reactions or side effects/adverse reactions.**

OBJECTIVE II: Identify the nurse's responsibility in relation to the physician's order.

Nursing Responsibilities:

- A. **Verify orders** written by the authorized prescriber for accuracy and completeness, (e.g., safe dosage range, correct route and time intervals, nursing implications, start and stop dates, medical alerts, diet and drug interactions, and drug-drug interactions).
- B. **Assess the patients/individuals condition** prior to preparing the medication(s). Evaluate physical and emotional status to determine whether the patient/individual can take the medications (e.g., check to see if he/she is NPO, sedated, etc.).
- C. **Identify therapeutic and adverse effects of the drugs.** Check in the PDR, pharmacology books, etc. for use, side effects/adverse reactions, contraindications, drug interactions, nursing implications, and recommended safe dosages. Contact the RN, Medical Provider, or Pharmacist for additional information when indicated.
- D. **Utilize nursing implications:** e.g., monitor vital signs, implement special precautions, and notify the RN/Medical Provider of any concerns with treatment.
- E. **Prepare medications and treatments** utilize aseptic technique, proper equipment, calculations of dosages, and other nursing procedures.
- F. **Administer medications and treatments:** Utilize the six rights, therapeutic verbal and non-verbal communication, teach the patient/individual what to expect from the medications and follow through with nursing procedures as indicated.
- G. **Assess the patients/individuals conditions and effects of the medications** on an on-going basis.
- H. **Document on appropriate forms** all medications that are administered, drug effects and side effects/adverse reactions, vital signs, other nursing actions taken, communication with RN/medical provider if indicated.

- I. **Communicate information** to the team about the patients/individuals condition and effects of prescribed medications.
- J. **Assume responsibility for storage and security of medications** according to facility policy.
- K. **Requisition and return drugs to the Pharmacy** per facility policy.
- L. **Make nursing judgments:** when to seek guidance from the RN (e.g., medium to use for administering a medication) or medical provider for patients/individuals experiencing adverse drug reactions, legal obligations and limitations, etc.
- M. **Delegate responsibly:** delegating is transferring the authority to perform a selected nursing task in a selected situation. The nurse retains accountability for the delegation and must communicate what is to be done, when, where, how and any other pertinent information. The nurse must delegate to a person who has the appropriate training for the task and follow-up on the outcome. The five rights of delegation include the right: task, circumstance, person, direction/communication, and supervision/evaluation.

OBJECTIVE III: Identify precautions to take to prevent medication errors.

- A. **Climate conducive to concentration:**
 - 1. Well lit work area.
 - 2. Proper equipment/supplies.
 - 3. Quiet work area free from conversations and distracting noises.
 - 4. Neat and orderly work area.
 - 5. Proper storage of drugs.
- B. **Knowledge of the patients/individuals condition:**
 - 1. **Emotional:**
 - a. disoriented
 - b. hostile
 - c. mute/withdrawn
 - d. hoarding
 - 2. **Physical:**
 - a. medical alerts
 - b. limitations (e.g., swallowing difficulty)
- C. **Utilization of rights of medication administration:**
 - 1. Right patient/individual.
 - 2. Right drug.
 - 3. Right dose.
 - 4. Right route.
 - 5. Right time.
 - 6. Right documentation.

D. **Administration of medications:**

1. **Procedure:**
 - a. **check the medication administration sheet (MAR) with the medical provider's order.** The order, MAR, and label on the medication bottle/packet should be the same.
 - b. check the label on the medicine bottle/container or unit dose package against the MAR **three (3) times** before administration.
 - c. **NEVER** administer medications prepared by another person (co-worker).
2. **Documentation:**
 - a. chart medications immediately after they are given.
 - b. sign out controlled drugs on the Controlled Substance Sign Out Sheet when the drug is removed from the cart/cabinet and prepared for administration.

OBJECTIVE IV: Identify physical characteristics of various forms of oral medications which require special consideration when administering.

A. **Solids:**

1. **Tablets** (e.g., Aspirin):
 - a. powdered medications compressed into small discs.
 - b. avoid breaking unless the tablet is scored.
 - c. may crush some tablets if the patient/individual has difficulty swallowing.
2. **Enteric coated tablets** (e.g., Bisacodyl-Dulcolax, Ferrous Gluconate):
 - a. will **NOT** dissolve or begin action until reaching the small intestines.
 - b. **NEVER** crush or dissolve.
 - c. instruct the patient/individual **NOT** to chew the tablets.
 - d. avoid giving with milk, milk products, or Antacids.
3. **Capsules** (e.g., Phenytoin -Dilantin):
 - a. gelatin containers which hold a powder or liquid drug.
 - b. avoid opening unless approved by the Pharmacy.
4. **Powders** (e.g., Psyllium Hydrophilic-Metamucil):
 - a. reconstitute with water or other liquids.
 - b. read and follow directions.

B. **Liquids:**

1. **Suspensions** (e.g., Milk of Magnesia):
 - a. medications mixed with a liquid but not dissolved.
 - b. shake before administering.
2. **Elixirs** (e.g., Diphenhydramine HCL-Benadryl, Phenobarbital):
 - a. medications dissolved in a solution of alcohol and water which has been sweetened and flavored.
 - b. avoid diluting.
 - c. follow administration with water.
 - d. use should be avoided in known alcoholics; use caution if alcohol abuse is suspected.

3. **Syrups** (e.g., 2 G Cough Syrup):
 - a. medications dissolved in a solution of sugar and water with flavoring.
 - b. **DO NOT** follow with liquids.
 - c. use caution when administering to diabetics (sugar-free available).
 - d. administer syrups after giving other medications.

OBJECTIVE V: Select the appropriate media to use in medication administration.

- A. **Solids:** (e.g., applesauce, pudding, thickened fluid, ice cream):
 1. Used to facilitate swallowing, disguise taste, prevent gastric irritation, or enhance absorption.
 2. Be careful media does not impede absorption.
 3. As tolerated, offer liquids following the administration of a solid medium.

- B. **Liquids:**
 1. **Offer liquids** following medication administration unless contraindicated.
 2. **Water:** some medications need to be taken with a reasonably large volume of water.
 - a. Sulfonamides - to prevent precipitation in the kidneys.
 - b. Psyllium Hydrophilic -Metamucil - to produce bulk forming laxative effect.
 - c. Lithium - to enhance excretion.
 - d. Potassium Supplements - to prevent saline laxative effect.
 3. **Milk:** some medications should NOT be taken with milk or milk products or antacids because they may dissolve the enteric coating and release irritating drugs into the stomach (e.g., iron preparations) or interfere with absorption by forming a precipitate (e.g., Tetracycline).
 4. **Juices:** some medications should NOT be taken with fruit juices which are acidic and cause premature breakdown of the drug (e.g., Penicillin, Erythromycin).

- C. **Meals:**
 1. Generally, medications are absorbed more readily on an empty stomach, one hour before meals or two hours after meals.
 2. Some medications need to be taken on an empty stomach to speed absorption (e.g., Antispasmodics).
 3. Some medications are too irritating to be taken on an empty stomach and must be taken with or immediately after meals (e. g., Ibuprofen-Motrin).

- D. **Medication Administration by Enteral Tube:**
 1. Administer medications in liquid form if available or crush solid medication as finely as possible. Check with pharmacist, if necessary, to ensure solid medications can be crushed or capsules opened.
 2. **NEVER** crush an enteric-coated tablet or time released capsule.
 3. Dilute thick liquid or crushed medication with water or recommended liquid.
 4. Verify tube placement per policy prior to administering medications.

5. Ideally, each medication should be administered separately with a flush of 5cc water between medications which are administered in the same dosing time. When a person receives multiple medications, pharmacy should be consulted for possible incompatibilities and/or recommendations.
6. Flush with 30-50cc of water before and after medication administration.
7. When a medication is ordered that should be administered on an empty stomach and the person receives continuous feedings, the Medical Provider/Pharmacy should have specific orders to address stopping the feeding before and after as determined necessary.
8. If person receives continuous enteral feedings, flow should be stopped, and tip stored so as not to be contaminated while medications are administered. Flow of formula is reestablished after medications are given unless ordered otherwise.
9. **DO NOT** use a plunger to force liquids through the tube. A gentle nudge is acceptable. Allow medications and fluids to go in by gravity.

OBJECTIVE VI: Identify patients/individuals rights regarding medications.

A. Knowledge of medication:

1. The patient/individual and/or guardian has the right to receive adequate information about the medications he/she is taking including name of the medication(s), intended use, side effects/adverse reactions, and administration techniques.
2. When appropriate, the patients/individuals family or significant other(s) should be involved.
3. The RN is responsible for assessing and developing the patients/individuals medication teaching plan.
4. All patient/individual medication education provided **MUST** be documented in the patients/individuals record. Documentation should include a specific description of:
 - a. who was taught (e.g., patient/individual, family).
 - b. what was taught (e.g., drug name, side effects).
 - c. how it was taught (e.g., handouts, demonstration).
 - d. patient's/client's, guardian's, family's response.
 - e. assessment of effectiveness and additional education needed.

B. The patient/individual has the right to refuse medications and treatments.

1. With verbal or physical refusal, the nurse should, if possible:
 - a. assess the reason for the refusal.
 - b. reattempt the procedure later if not contraindicated.
 - c. request assistance from other team members as appropriate.
 - d. counsel the patient/individual as appropriate.
2. If the patient/individual refuses again:
 - a. notify the RN/medical provider.
 - b. document in the progress note:
 - (1.) facts and circumstances surrounding the refusal.
 - (2.) time the medical provider was notified.

- (3.) action(s) taken.
 - c. consider administration by another nurse.
 - 3. If the patient/client continues to refuse:
 - a. the Treatment Team should evaluate and develop a plan of care.
 - b. appropriate courses of action are discussed with the patient/individual and/or guardian.
 - c. refusal is documented in the progress notes.
- C. **Some patients/individuals may have Advanced Directives or a behavioral intervention plan which must be considered.**

OBJECTIVE VII Identify steps to take when a drug's effect (therapeutic effect, side effect, or adverse reactions) is observed.

- A. **Assessment of the patient/individual:**
 - 1. Previous condition.
 - 2. Present condition.
- B. **Nursing Interventions shall be implemented as indicated:** initiation of routine orders, monitoring of vital signs, increased observation, emergency interventions if necessary, etc.
- C. **Communication to the RN/medical provider:**
 - 1. Adverse reactions: (e.g., hypertensive crisis, anaphylactic shock).
 - 2. Side effects: (e.g., dry mouth with Antihypertensive Drugs).
 - 3. Therapeutic effects: (e.g., reduction in delusions and hallucinations with Antipsychotics, symptom control).
 - 4. Absence of desired effects: (e.g., continued symptoms of infection with antibiotic therapy).
 - 5. Nursing interventions.
- D. **Documentation:**
 - 1. Observations.
 - 2. Nursing interventions.
 - 3. Patients/individuals response to nursing interventions.
 - 4. Information communicated to the medical provider.

OBJECTIVE VIII: Identify policies pertaining to proper medication storage.

- A. **Security measures:**
 - 1. Medication cart/cabinets **MUST** be locked at all times when unattended.
 - 2. Controlled substances **SHALL** be secured and accounted for according to facility policy.
- B. **Method of storage:**
 - 1. **Container:**

- a. keep bottles capped to prevent exposure to air and moisture.
 - b. colored bottles are used to protect some drugs from light.
 - c. check and adhere to expiration dates.
 - d. wipe tops of bottles to prevent liquids from running down the sides, which may obscure the label and cause the cap to stick.
2. **Temperature:**
- a. store drugs requiring a cool temperature in the refrigerator designated for medications.
 - b. avoid exposure of medications to excessive heat.
3. **Systematic arrangement:** internal and external drugs should be stored separately (i.e., on separate shelves or cabinets).
- C. **Return to the Pharmacy:**
- 1. Mislabeled or illegible containers.
 - 2. Medications that have changed in appearance, odor, or color.
 - 3. Discontinued medications.
 - 4. Outdated medications.

OBJECTIVE IX: Identify the proper procedure for administering medications which are either oral, applied, instilled, or inhaled.

***NOTE: Follow the Facility's Nursing Procedure and/or Clinical Performance Evaluation. Use Standard Precautions.**

- A. Assemble equipment, wash hands, validate the medical provider's order(s), remove the medication from the cabinet/cart and explain the procedure to the patient/individual in terms he/she understands.
- B. All medications **MUST** be identifiable until time of administration.
- C. **Oral:** See Objective 4 (forms of oral medications) and Objective 5 (appropriate media) when preparing oral medications.
 - 1. **Solids:** When using unit dose, preparations **MUST** be left in the packaging until time of administration.
 - 2. **Liquids:**
 - a. use a medicine cup with correct markings, locate the correct dosage marking on the cup.
 - b. keep your thumbnail on the dosage mark, position the cup at eye level on a flat surface, and pour the correct dosage.
 - c. while pouring, keep the label against the palm of your hand so any spilled liquid will not obscure the label.
 - d. set the cup on a level surface and read the base of the meniscus at eye level.
 - e. **DO NOT** mix liquid medications together unless approved by the Pharmacist.
 - 3. **Sublinguals:**

- a. Instruct the patient/individual to wet the tablet with saliva and place it underneath the tongue.
 - b. Instruct the patient/individual **NOT** to swallow or chew tablets or to drink water since doing so would interfere with the medication's effectiveness.
 - c. Often the preferred form of medication for resistive or non-compliant individuals.
- D. **Topicals:** (e.g., ointments, creams, lotions, patches)
1. Wear gloves to prevent topicals from coming in contact with your skin.
 2. Remove patch and residue from previous application.
 3. Apply medication to clean, dry skin (thin layer if an ointment).
 4. Rotate sites of patches to prevent irritation.
- E. **Eye Preparations (Ophthalmic):**
1. Be sure the medication is labeled "**For Ophthalmic Use.**"
 2. Warm medications to room temperature (if refrigerated).
 3. Instruct the patient/individual to lie or sit down with head tilted back, if tolerated.
 4. Cleanse the eye to remove any exudate.
 5. Expose the lower conjunctival sac.
 6. Squeeze a thin ribbon of ointment along sac or drop the prescribed drops into the center of the sac being careful that the dropper/tube does not touch the eye.
 7. Instruct the patient/individual to close his/her eye for 1-2 minutes to allow absorption.
- F. **Ear Preparations (Otic):**
1. Be sure medication is labeled "**For Otic Use**" or "**For Use in Ears.**"
 2. Warm the medication to body temperature (if not contraindicated) by holding container under warm water.
 3. Instruct the patient/individual to lie on his/her side with the ear to be treated facing upward.
 4. Straighten the ear canal by gently pulling the auricle up and back.
Remember: an infected ear is usually very painful so be gentle. (If the patient/individual is a child under 3 years, pull the auricle down and forward.)
 5. Taking care **NOT** to touch the ear with the dropper, instill the prescribed drops.
 6. Instruct the patient/individual to remain on his/her side for a few minutes after instillation.
- G. **Nose Preparations (Drops):**
1. Position the patient/individual on his/her back with shoulders elevated and head tilted back.
 2. Insert the dropper about 1/3 inch in the nares and instill the prescribed drops. **DO NOT** touch the external nares with the dropper.
 3. Instruct the patient/individual to maintain his/her position, if tolerated, for approximately 5 minutes until the medication is absorbed.
- H. **Suppositories:**

1. Use gloves for insertion.
2. To insert a rectal suppository:
 - a. instruct the patient/individual to lie on his/her left side and to breathe through his/her mouth to relax the sphincter.
 - b. gently insert the suppository beyond the internal sphincter. Use lubricant if necessary.
 - c. have the patient/individual remain on his/her side for at least 20 minutes, if tolerated, to prevent expulsion.
3. To administer vaginal suppositories:
 - a. place the patient/individual in a lithotomy position.
 - b. cleanse the perineum with warm, soapy water.
 - c. insert the applicator 2 inches into the vagina; deposit the suppository.
 - d. instruct the patient/individual to remain in bed at least 20 minutes to prevent expulsion.
 - e. apply a perineal pad to avoid stains to undergarments.

I. Inhalants:

1. Follow the manufacturer's instructions for the specific inhaler, nebulizer, or atomizer.
2. In general, the patient/individual should be instructed to use diaphragmatic and pursed-lip breathing procedures.
3. Instruct the patient/individual to exhale fully to begin and then breathe slowly and deeply during the procedure, exhaling as fully as possible.

OBJECTIVE X: Identify the proper techniques for preparing and administering parenteral medications (injectables).

A. Reasons for administering drugs parenterally:

1. The medication is destroyed if given orally and exposed to gastric juices.
2. The medication is irritating to the gastrointestinal tract.
3. The medication needs to reach the bloodstream more quickly than could be accomplished if given by mouth.
4. The patient/individual is unable to take the medication by mouth:
 - a. NPO.
 - b. cannot swallow or is unconscious.
 - c. nauseated/vomiting.
 - d. gastric suctioning.
 - e. uncooperative (adhere to the facility's policy on medication refusal).

B. Guidelines for parenteral administration:

NOTE: Follow the Facility's Nursing Procedure and/or Clinical Performance Evaluation. Use Standard Precautions.

1. **Selection of site:**
 - a. select the site carefully to avoid major nerves and blood vessels.
 - b. select a site based on amount and type of solution.
 - c. **DO NOT** select the site with the following: lesions, inflammation, burns, scars, hardened or edematous areas.
 2. **Use sterile needles and syringes:** If patient/individual should move and the needle comes out, **discard the needle only**, obtain a new sterile needle and select a new site.
 3. **Ensure the needle and syringe are correct** for the injection and the patients/individuals body size.
 4. **Check for blood backflow (aspirate) prior to injecting unless contraindicated. (DO NOT ASPIRATE WITH INTRADERMAL INJECTIONS.)** If blood is aspirated, **discard the needle, syringe and medication in the syringe**; with new syringe and needle, draw up more medication; and inject the medication in a different site.
 5. **Establish a site rotation plan for frequent injections. The same injection point within a site should NOT be used more often than once a month.**
- C. **Parenteral administration requires that the nurse adhere to the following principles of administration:**
1. **Assemble equipment**, wash hands, validate the medical provider's order, remove the medication from the cart/cabinet, and explain the procedure to the patient/individual in terms he/she understands.
 2. **Prepare the medication:**
 - a. use sterile technique to remove the medication from the vial, bottle or ampule.
 - b. in most cases, gently shake the container to mix the medication thoroughly. **EXCEPTION:** Insulin vial should be rolled in the palm of hands to mix.
 3. **Prepare the site:** Clean the site from the center outward with a circular motion when applying the skin preparation.
 4. **DO NOT recap needles after use** unless it is absolutely medically necessary. If it is necessary to recap, use the one-handed technique or safety device to recap per OSHA guidelines.
 5. **Discard the needle/syringe in a puncture proof container** per facility policy.
- D. **Types of injections:**
1. **Intradermal:**
 - a. **definition:** injection into the outer layer of skin.
 - b. **purpose:**
 - (1.) to determine sensitivity to a specific antigen and to stimulate an immune response.
 - (2.) to identify antibodies that have developed against pathogens, such as tuberculosis.
 - (3.) to infiltrate the skin with an anesthetic before invasive procedures.

- c. **PRECAUTION:** Individuals can have a severe anaphylactic reaction to test antigens. This requires an **immediate injection of Epinephrine 1:1000** and other emergency procedures per facility policy. Be especially alert for an anaphylactic response after giving a test dose of Penicillin or Tetanus Antitoxin.
 - d. **sites:** usual site is the inner surface of the forearm.
 - e. **procedure:**
 - (1.) assemble equipment and prepare the medication:
 - (a.) prescribed medication.
 - (b.) 1 ml tuberculin syringe with 27G 5/8" needle.
 - (c.) alcohol swab.
 - (2.) position the forearm and stretch the skin taut with the thumb.
 - (3.) cleanse the site.
 - (4.) position the needle almost flat with the skin with the bevel up. Insert the needle by pressing against the skin until resistance is met. Advance the needle through the epidermis. Stop when it is resting 1/8" below the skin surface. **DO NOT ASPIRATE.**
 - (5.) slowly inject the medication; expect resistance.
 - (6.) watch for a small wheal to form about 1/4" in diameter.
 - (7.) withdraw the needle. **DO NOT MASSAGE THE SITE.**
 - (8.) document administration according to the facility's policy.
 - (9.) read the test as specified on the medication insert and document results.
 - f. **Tuberculin (PPD):**
 - (1.) **CONTRAINDICATIONS:** (e.g., verified history of positive reaction, within 6 weeks of viral infection or vaccine, taking corticosteroids-prednisone, and allergy to PPD).
 - (2.) test is read in 48-72 hours. A positive reaction is denoted by a palpable induration (firmness to touch).
 - (3.) document date read and results on the Immunization Record (according to facility policy).
 - (a.) always record in millimeters (mm's).
 - (b.) interpret results according to the latest epidemiological guidelines from the NC Department of Communicable Disease, HIV/Hepatitis Branch.
2. **Subcutaneous:**
- a. **purpose:**
 - (1.) to allow for slow absorption of injectable medication.

NOTE: Heparin is absorbed just as rapidly when given subcutaneously as when given intramuscularly.
 - (2.) when medications cannot be given by mouth (e.g., insulin) or when the medication interferes with the function of the stomach or intestines.
 - b. **sites:**
 - (1.) outer aspect of the upper arm.
 - (2.) anterior surface of the thigh.

- (3.) lower abdomen.
- (4.) upper back.
- (5.) upper buttocks.

NOTE: When selecting a site, be sure there is **at least 1 inch of fat fold** when tissue is pinched between the thumb and forefinger. The selection of the needle size (5/8" or 1/2") and angle of insertion depends on the size of the person, the type of medication and the amount of fat fold.

- c. **equipment:**
 - (1.) syringe with 25G - 23 G needle. Lengths of needles can vary from 1/2" to 1". For most, the length is 5/8"; usual length for insulin is 1/2".
 - (2.) prescribed medication.
 - (3.) alcohol swab.
- d. **procedure:**
 - (1.) inject amount of air equal to prescribed medication into the vial.
 - (2.) withdraw prescribed amount of medication and follow the facility's policy.
 - (3.) cleanse the site.
 - (4.) grasp the flesh between the thumb and forefinger and insert the needle at a **45 degree angle if using a 5/8" needle or 90 degree angle if using a 1/2" needle.**
 - (5.) relax the grip and pull back slightly on the plunger (aspirate) to check needle placement.
 - (6.) inject the solution slowly.
 - (7.) withdraw the needle quickly at the same angle it was inserted and apply pressure with alcohol sponge over the injection point. Gently massage the site unless contraindicated. **(CONTRAINDICATED WITH HEPARIN).**
- e. **guidelines for Insulin injection:**
 - (1.) types of Insulin (refer to Unit I - *Hormones and Synthetic Substitutes*).
 - (2.) administered like any other subcutaneous injection.
 - (3.) points of emphasis.
 - (a.) Insulin is stored in a cool area (according to the facility policy). **DO NOT ALLOW IT TO FREEZE.**
 - (b.) **ALWAYS** check the expiration date prior to using.
 - (c.) **ALWAYS USE A U-100 INSULIN SYRINGE WITH U-100 INSULIN.**
 - (d.) blood sugar tests are usually performed before the patient/individual eats or is administered Insulin.
 - (e.) follow a site rotation plan. **DO NOT GIVE IN THE SAME POINT OF AN INJECTION SITE MORE FREQUENTLY THAN ONCE A MONTH.**

- (f.) before drawing up an Insulin Suspension, gently roll and invert the bottle to ensure particle distribution. **NEVER SHAKE** the vial because it causes foaming, changing the potency and altering the dose.
- (g.) Regular and NPH Insulin can be mixed in the same syringe using the following steps:
 - [1.] clean the tops of both vials with an alcohol sponge.
 - [2.] draw up the amount of air equal to the ordered dosage of NPH Insulin and inject into the NPH vial. **DO NOT** extract the drug or allow the needle tip to touch the medication. Remove the needle.
 - [3.] draw up the amount of air equal to the ordered dosage of Regular Insulin, inject the air into the vial and withdraw the Regular Insulin.
 - [4.] insert the needle into the NPH Insulin, holding the vial at eye level and extract the desired dose.

f. **guidelines for Heparin injections:**

- (1.) the preferred site for a Heparin injection is the lower abdominal fat pad beneath the umbilicus between the iliac crests.
- (2.) **ALWAYS ROTATE THE SITES FROM SIDE TO SIDE OF THE UMBILICUS.**
- (3.) **DO NOT** administer Heparin within 2 inches of a scar, bruise or the umbilicus.
- (4.) administer the Heparin at a 90 degree angle using a 1/2" needle.
- (5.) **DO NOT ASPIRATE.**
- (6.) **DO NOT MASSAGE.**

3. **Intramuscular injections:**

a. **purpose:**

- (1.) when a more rapid action is desired than can be obtained from subcutaneous injections.
- (2.) to avoid loss of drug effects due to vomiting or gastric activity.
- (3.) to administer medications to an individual who is uncooperative, unconscious, or unable to swallow.

b. **sites:**

- (1.) deltoid.
- (2.) ventrogluteal (V-shape).
- (3.) upper outer quadrant of the buttocks.
- (4.) vastus lateralis (lateral anterior portion of the thigh).

NOTE: Assess the muscle mass to determine the capacity for absorption. When administering 2-4 cc's, **ALWAYS** use the upper outer quadrant of the buttocks or divide the dose in half and give in 2 sites (Refer to the facility's policy for maximum dose allowed in one site).

- c. **equipment:**
 - (1.) same as subcutaneous except syringe and needle.
 - (2.) 2-3 cc syringe with 19-22G, 1-2" needle.
- d. **procedure:** same as subcutaneous except:
 - (1.) stretch skin taut over the intended injection site to spread the subcutaneous tissue thinly.
 - (2.) **ALWAYS** insert the needle at a 90 degree angle.
- e. **procedure for Z-track:**
 - (1.) the Z-track method is used for medications which are highly irritating (e.g., Imferon, Haloperidol [Haldol] or Fluphenazine [Prolixin] Decanoate) or which may cause discoloration to the tissue.
 - (2.) the upper outer quadrant of the buttocks is the preferred site.
 - (3.) to administer:
 - (a.) draw up 0.2 - 0.3 cc air into the syringe after preparation.
 - (b.) change the needle so there is no risk of irritation from residual medication.
 - (c.) displace the skin laterally away and downward from the intended site and hold throughout the injection.
 - (d.) cleanse the site and insert the needle at a 90 degree angle.
 - (e.) aspirate and inject the medication.
 - (f.) wait 10 seconds after the medication and air are injected to remove the needle.
 - (g.) pull the needle straight out and release the skin.
 - (h.) **DO NOT MASSAGE THE SITE.**

OBJECTIVE XI: Identify the correct procedure for documenting medication administration.

Document the following information when a medication is administered:

- A. **Medication:** including name as ordered, dose, dosage form, and route.
- B. **Site:** (if appropriate e.g., injection, instillation).
- C. **Patients/individuals response** to medication administration.

NOTE: In addition, per The Nursing Practice Act of North Carolina, 90-171.20, the practice of nursing includes recording: the nurse assessment, plan of care (initiated by the RN and reinforced by the LPN), care given, and the patients response to that care. Any change in the plan of care should be documented along with notification to a medical provider and what orders were received.

OBJECTIVE XII: Identify steps to take when a medication error is detected.

- A. **Identification of the error.**
- B. **Interventions:**
 - 1. Initiate appropriate nursing interventions (e.g., observation, vital signs).
 - 2. Notify the RN/medical provider/pharmacist.
- C. **Documentation:**
 - 1. Facility's Error Report.
 - 2. Patients/individuals record.
 - 3. Incident Report, if applicable.
- D. **Assessment of reason the error occurred.**
 - 1. Type of error.
 - 2. Origin of the error.
 - 3. Which of the six (6) rights were not followed.
- E. **Corrective Action taken, if any.**

NOTE: Refer to the facility's policy and procedure manuals.

OBJECTIVE XIII: Demonstrate the proper technique for preparing and administering medications.

Demonstrated by completion of the "Medication Administration Clinical Performance Evaluation."

UNIT III: DOSAGE COMPUTATION

OBJECTIVE: By the end of this unit, the nurse will be able to compute drug dosage problems.

Medications are available in different forms with varying dosages which are appropriate for various routes of administration. If the dosage ordered by the physician happens to be larger or smaller than the dosage available, the nurse must calculate the correct dose to administer.

It is the nurse's responsibility to obtain from the pharmacy, medication in a dosage form which can be measured accurately. If this is not available, return to the medical provider for further orders. (Example: A scored tablet may be broken; however, if the tablet is not scored, the nurse should **NOT** attempt to break it.)

There are several methods of obtaining dosages from smaller or larger dosages of a prescribed drug. To compute the mathematical problem, simple formulas have been devised.

FORMULA I:

The desired dose or dose ordered by the medical provider over the dose on hand multiplied by the quantity on hand over one to express in fractions. Using this formula, you get the dosage (tablets, ml's, etc.) to be given.

$$\frac{D - \text{Desired Dose}}{H - \text{On Hand Dose}} \times \frac{Q - \text{Quantity On Hand}}{1} = \text{Dosage to Be Given}$$

Examples of Formula I:

1. Chlorpromazine HCl 0.05 Gm p.o. q.i.d. is ordered. The bottle is labeled 25 mg per tablet. How many tablets would you give?

Step I: Set up your formula as a fraction:

$$\frac{D}{H} \times \frac{Q}{1} = \frac{0.05 \text{ Gm}}{25 \text{ mg}} \times \frac{1}{1} =$$

Step II: Use the conversion chart:

Change the "desired dose" and "on hand dose" to the same system.

$$\frac{0.05 \text{ Gm}}{25 \text{ mg}} \times \frac{1}{1} = \frac{50 \text{ mg}}{25 \text{ mg}} \times \frac{1}{1}$$

Step III: Do simple math:

$$50 \text{ mg} \times \frac{1}{1} = \frac{2}{25} \left(\frac{50}{25} \right) = 2 \text{ tablets}$$

25 mg 1

Step IV: HAVE YOU ANSWERED YOUR ORIGINAL QUESTION?

2. Sinequan 20 mg p.o. b.i.d. is ordered. The bottle is labeled 10mg per capsule. How many capsules will you give?

Step I: Set up your formula as a fraction:

$$\frac{D}{H} \times \frac{Q}{1} = \frac{20 \text{ mg}}{10 \text{ mg}} \times \frac{1}{1} =$$

Step II: The desired amount and what you have on hand is the in the same measurement system, milligrams (mg) so the conversion chart is not needed.

Step III: Do simple math:

$$\frac{20}{10} \times \frac{1}{1} = \frac{20}{10} = 10 \left(\frac{2}{20} \right) = 2 \text{ capsules}$$

Step IV: HAVE YOU ANSWERED YOUR ORIGINAL QUESTION?

3. Digoxin 0.125 mg IM "stat" is ordered. The label reads Digoxin 0.25 mg per ml. How many ml's will you give?

Step I: Set up your formula as a fraction:

$$\frac{D}{H} \times \frac{Q}{1} = \frac{0.125 \text{ mg}}{0.25 \text{ mg}} \times \frac{1 \text{ cc}}{1} =$$

Step II: The desired amount and what you have on hand is in the same measurement system, milligrams (mg), so you do not have to use the conversion chart.

Step III: Do simple math:

$$\frac{0.125}{0.250} \times \frac{1}{1} = \frac{0.125}{0.250} = 0.250 \left(\frac{0.5}{0.125} \right) = 0.5 \text{ cc's}$$

Step IV: HAVE YOU ANSWERED YOUR ORIGINAL QUESTION?

FORMULA II:

Problems of medication dosage can be calculated by the use of a proportion. The physician's order states the strength and/or amount required. The medication container designated the strength that is provided.

Examples of Formula II:

1. Navane 10 mg p.o. b.i.d. is ordered. The bottle is labeled Navane 5 mg per tablet. How many tablets will you give?

Step I: On the left side of the proportion, place what you know or have available. In this example, each tablet equals 5 mg so the left side of the proportion would be:

$$\frac{5 \text{ mg}}{1 \text{ tablet}} =$$

What the right side of the proportion will be is determined by the Medical provider's order and the abbreviations used on the left side of the proportion. Only two different abbreviations may be used in a single proportion:

Example: tablet and mg - you may need to use a conversion chart to get the right side of the proportion into the same system of measurement as the left side. The abbreviations must be in the same position on the right as they are on the left.

$$\frac{5 \text{ mg}}{1 \text{ tablet}} = \frac{\text{mg}}{\text{tablet}}$$

The medical provider has ordered 10 mg of Navane.

$$\frac{5 \text{ mg}}{1 \text{ tablet}} = \frac{10 \text{ mg}}{\text{tablet}}$$

Since we need to find out the number of tablets to be given, we use the symbol "X" to represent the unknown. Therefore, the full proportion should be:

$$\frac{5 \text{ mg}}{1 \text{ tablet}} = \frac{10 \text{ mg}}{X \text{ tablet}}$$

Step II: Rewrite the proportion without using the abbreviations:

$$\frac{5}{1} \times \frac{10}{X}$$

Step III: Solve for X:

$$\frac{5}{1} \times \frac{10}{X}$$

$$5 X = 10$$

$$\frac{5 X}{5} = \frac{10}{5}$$

$$X = \frac{10}{5} = 5 \left(\frac{2}{10} \right)$$

$$X = 2 \text{ tablets}$$

Step IV: HAVE YOU ANSWERED YOUR ORIGINAL QUESTION?

Now practice by working the calculation problems using either of the above formulas.

COMMON EQUIVALENTS

$$1 \text{ Gm} = 1000 \text{ mg}$$

$$30 \text{ cc} = 1 \text{ fluid ounce}$$

$$5 \text{ cc} = 1 \text{ teaspoon}$$

$$15 \text{ cc} = 1 \text{ tablespoon} = \frac{1}{2} \text{ fluid ounce}$$

$$1 \text{ L (liter)} = 1000 \text{ cc}$$

$$1 \text{ ml} = 1 \text{ cc}$$

$$16 \text{ minims} = 1 \text{ cc}$$

CALCULATION PROBLEMS

1. Order: Dilantin 0.3 Gm's once daily
Bottle: Dilantin 100 mg capsules
Question: How many capsules will you give?
2. Order: Prolixin HCl Injection 7.5mg IM stat
Bottle: Prolixin HCl Injection 2.5 mg/cc
Question: How many cc's will you give?
3. Order: Gantanol suspension 2 Gm's
Bottle: Gantanol suspension 0.5 Gm/5 cc's
Question: How many cc's will you give?
Question: How many tsp's will you give?
4. Order: Robicillin VK 600,000 units PO every 8 hours
Bottle: Robicillin VK 400,000 units/5 cc's
Question: How many cc's will you give?
5. Order: Valium 2 mg IM
Bottle: Valium 5 mg/cc
Question: How many cc's will you give?
6. Order: Risperdal 2.5 mg PO BID
Bottle: Risperdal 1 mg/ml
Question: How many ml's will you give?
7. Order: Benadryl 25 mg IM
Bottle: Benadryl 50 mg/cc
Question: How many cc's will you give?
8. Order: Lanoxin Elixir 0.25 mg q 6h
Bottle: Lanoxin Elixir 0.05 mg/cc
Question: How many cc's will you give q 6 h?
9. Order: Zyprexa 7.5 mg po daily
Bottle: Zyprexa 2.5 mg/tablet
Question: How many tablets will you give?
10. Order: Colace Syrup 100 mg daily at bedtime
Bottle: Colace 25 mg/5 cc's
Question: How many cc's will you give at bedtime?
How many tsp's will you give at bedtime?
11. Order: Potassium Chloride 24 mEq PO BID
Bottle: Potassium Chloride 8 mEq/capsule

- Question: How many capsules will you give?
12. Order: Colace syrup 60 mg's daily at HS
Bottle: Colace syrup 120 mg/fl oz
Question: How many ounces will you give?
Question: How many cc's will you give?
13. Order: 800,000 U's Penicillin IM
Bottle: 500,000 U's/cc Penicillin
Question: How many cc's will you give?
14. Order: Depakene 500 mg PO TID
Bottle: Depakene 200 mg/5 ml
Question: How many ml's will you give?
15. Order: Lanoxin 0.25 mg's Lanoxin once daily
Bottle: Lanoxin 0.125 mg tablets
Question: How many tablets will you administer?

CALCULATION PROBLEMS

ANSWER KEY

1. 3 capsules
2. 3 cc's
3. 20 cc's
4 tsp's
4. 7.5 cc's
5. 0.4 cc's
6. 2.5 ml's
7. 0.5 cc's
8. 5 cc's
9. 3 tablets
10. 20 cc's
4 tsp's
11. 3 capsules
12. 0.5 ounces
15 cc's
13. 1.6 cc's
14. 12.5 ml's
15. 2 tablets