

# Medication Administration Education Program

North Carolina Department of Health and Human Services  
Division of State Operated Healthcare Facilities (DSOHF)

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**DHHS/DSOHF Medication Administration Course Curriculum  
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**Tests (Forms A, B, and C)**

## **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 State Operated Healthcare Facilities (DSOHF) shall demonstrate clinical competencies to administer medications. Clinical competencies for RNs and LPNs shall be based on successful completion of the DSOHF 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 a standardized curriculum which includes both theoretical and clinical components (DSOHF Medication Administration Examination and the facility's Clinical Performance Evaluation).

### **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 medications in a DSOHF 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).

Student nurses participating in a Preceptorship program within a DSOHF facility will be required to successfully complete the DHHS/DSOHF Medication Administration Exam and the facility's Clinical Performance Checklist prior to being allowed to administer medications independently. Additionally, the student may be credentialed in other clinical skills (per facility policy).

**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 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 the CWE and CPE may be taken a maximum of three (3) times. A different form of the CWE must be taken each time the nurse retakes the examination. 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 one-on-one 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.

**Maintenance of Clinical Competency:**

- A. Continued competency for licensure renewal must be maintained as defined by the North Carolina Board of Nursing.
- 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 DSOHF services and/or who has not worked in a nursing position within DSOHF within the previous 12 months will be required to successfully complete the medication exam and clinical performance checklist upon rehire.

**Failure to Maintain Clinical Competency:**

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/or 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. Supervises Physician's Extenders (PAs and FNPs).
3. May dispense medications in emergency situations.
4. Must co-sign telephone/verbal orders (per facility policy).
5. Discontinues medications/treatments.
6. Must co-sign PA and FNP orders (per facility policy).
7. Reviews all medication orders according to pharmacy designated review dates (per facility policy).

#### **B. Physician Extender (PA and FNP):**

1. **Physician Assistant (PA):**
  - a. May prescribe or administer medications (per facility policy).
  - b. Must be supervised by a N.C. licensed physician.
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 or administer medications (per facility policy).

#### **C. Pharmacist:**

1. Compounds, dispenses, packages, and labels medications/treatments.
2. Screens all orders for and reports potential drug interactions, adverse reactions or side effects to the authorized prescriber and to nurses.
3. Maintains and is accountable for the security systems for handling medications.
4. Provides individual medication information.
5. May receive telephone/verbal orders from an authorized prescriber (per facility policy).
6. Reviews all medication orders according to pharmacy designated review dates (per facility policy).



**D. Registered Nurse:**

1. Administers medications by the oral, topical, instillation, inhalation, rectal, vaginal, intramuscular, subcutaneous, intradermal, enteral, and parenteral routes (including intravenous fluids and medications via the peripheral vascular or central venous route) under the order of an authorized prescriber (per facility policy).
2. Delivers individual dose medications to an individual for self-administration under the order of an authorized prescriber.
3. Records medication doses delivered or administered to an individual.
4. Transcribes orders onto Medication Administration Records, Treatments Administration Records, etc. as indicated (per facility policy).
5. Quality checks all new medication/treatment orders (per facility policy).
6. Assesses, monitors, and documents drug effects and side effects/adverse reactions and nursing interventions.
7. Receives or assumes responsibility for writing telephone/verbal orders from an authorized prescriber (per facility policy).
8. Assesses the need for and grants approval for the administration of ordered PRN medications (per facility policy).
9. Assesses, develops, and initiates individual medication teaching plans.
10. Supervises LPN's in the administration of medications and treatments.
11. May delegate the administration of medications and treatments to the LPN per facility policy; may delegate the task of administration of certain medicated treatments to unlicensed staff (per facility policy).
12. May authorize unlicensed staff to administer medications in the group home settings after verification of clinical skills (per facility policy).

**E. Licensed Practical Nurse:**

1. Must practice under the supervision of a RN.
2. Administers medications by the oral, topical, instillation, inhalation, rectal, vaginal, intramuscular, subcutaneous, intradermal, enteral, and parenteral routes (including intravenous fluids and medications via the peripheral vascular route) under the order of an authorized prescriber (per facility policy).
3. Delivers individual dose medications to an individual for self-administration under the order of an authorized prescriber.
4. Records medication doses delivered or administered to an individual.

5. Transcribes orders onto Medication Administration Records, Treatments Administration Records, etc. as indicated (per facility policy).
6. Observes, documents, and reports drug effects and side effects/adverse reactions and nursing interventions.
7. Receives or assumes responsibility for writing telephone/verbal orders from an authorized prescriber (per facility policy).
8. Administers designated PRN medications (per facility policy).
9. In accordance with facility policy, may assign certain medicated treatments to unlicensed staff (per facility policy).

**F. Unlicensed Personnel:**

Each DSOHF 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.

1. Administers medications and/or treatments in identified situations as specified and agreed upon by the Directors of Nursing and/or appropriate personnel in DSOHF facilities.
2. Records medication doses and treatments delivered to an individual.
3. Observes and reports drug effects/side effects/adverse reactions to a supervising RN.

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

- A. Agranulocytosis:** acute condition involving a severe and dangerous lowered white blood cell count. Symptoms include: sore throat, high fever, nosebleed, and rash.
- B. Chemotherapy:** the treatment of disease by means of drugs/medications that have a specific toxic effect upon the causative agent of the disease
- C. Clinical Institute Withdrawal Assessment for Alcohol (CIWA-A):** tool that rates ten common alcohol withdrawal signs/symptoms
- D. Clinical Opiate Withdrawal Scale (COWS):** tool that rates eleven common opiate withdrawal signs/symptoms
- E. Contraindication:** any condition that renders administration of a drug/medication improper or undesirable

- F. Detoxification:** a medically supervised treatment program for alcohol or drug addiction designed to purge the body of intoxicating or addictive substances and used as a first step in overcoming physiological or psychological addiction
- G. Dose:** measured quantity of a drug/medication to be given at one time
- H. 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
- I. Drug Abuse:** the use of a drug/medication for non-therapeutic effect, especially one for which it was not prescribed or intended
- J. Drug Actions:**
1. **Local Action:** an effect that takes place at the site of administration
  2. **Psychological Action:** an emotional response to a drug
  3. **Systemic Action:** an effect that occurs when the medication enters the bloodstream and travels to the cells
- K. Drug Dependence:** a psychological craving for, or physiological reliance, on a chemical agent
- L. Drug Effect:** the results of drug/medication action
1. **Therapeutic Effect:** desired effect from a treatment or drug/medication
  2. **Side Effect:** any effect other than the desired effect which is not usually harmful
  3. **Adverse Reaction:** a side effect that is so severe that it is harmful to the individual (ex. anaphylaxis)
  4. **Toxic Effect:** a poisonous effect resulting in drug-induced diseases and adverse reactions
  5. **Cumulative Effect:** a buildup of medication; cumulation occurs if the drug is taken and absorbed faster than it is excreted
  6. **Psychological Effect:** individual's perception of medication effect (It works because they think it works.)
- M. 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.,  $2 + 2 = 4$ ); no change in effect if given together
  2. **Antagonistic Effect:** combined effects are less than the sum of the individual effects (e.g.,  $2 + 2 = 3$ ); decreased effectiveness if given together

3. **Potentiation (Synergistic Effect):** response obtained is greater than the sum of the individual effects (e.g.,  $2 + 2 = 5$ ); enhanced effect if given together
- N. Extrapyramidal Symptoms (EPS):** physical symptoms that are primarily associated with improper dosing of or unusual reactions to neuroleptic medications
- ❖ **Dystonia:** Involuntary, irregular jerking contortions of the muscles of the trunk and extremities which are sustained and non-patterned. 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:** 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.
  - ❖ **Dyskinesia:** difficulty or distortion in performing voluntary movements (tics, 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 individual is unable to stop. The individual will describe the feeling as “though he 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 individual appears rigid and not able to move, yet agitated.
  - ❖ **Akinesia:** masked faces with decreased expressions and blank stares, loss of movement, difficulty walking, sitting, and standing.
- O. Generic Name:** the official name of a drug/medication (based on the chemicals found in the drug/medication)
- P. Habituation:** a psychological and emotional dependence on a drug/medication resulting from the repeated use of the substance
- Q. Hypersensitivity:** an allergic response to a drug/medication or other substance
- R. Idiosyncrasy:** an unusual, unexpected reaction to a drug/medication

- S. Indication:** sign and/or symptom that lets the physician know which drug to select for a specific illness
- T. Individual:** refers to patient/client/resident
- U. Negative Symptoms:** thoughts, feelings or behaviors normally present that are absent or diminished in an individual with a mental disorder
- V. Neuroleptic Malignant Syndrome (NMS):** a life threatening neurological disorder most often caused by an adverse reaction to neuroleptic or antipsychotic drugs.
- ❖ **Signs and Symptoms:**
- Muscle cramps/rigidity
  - Fever
  - Unstable vital signs
  - Changes in cognition – agitation, delirium, coma
  - Muscle tremors
  - Elevated WBC
  - Elevated CPK
- W. Official Name:** name under which a drug/medication is listed in the United States Pharmacopeia or the National Formulary
- X. Pharmacodynamics:** the branch of pharmacology dealing with the course of action, effect, and breakdown of drugs within the body
- Y. Pharmacokinetics:** the branch of pharmacology that studies the fate of pharmacological substances in the body (their absorption, distribution, metabolism, and elimination)
- Z. Pharmacology:** the study or science of drugs/medications including their origin, composition, pharmacokinetics, therapeutic use, and toxicology
- AA. Pharmacy:** a body of techniques involved in preparing, preserving, compounding, and dispensing of drugs/medications for medical use; a place where drugs/medications are compounded and dispensed
- BB. Positive Symptoms:** thoughts, behaviors or sensory perceptions present in an individual with a mental disorder, but not present in people without a mental disorder
- CC. Routes of Medication Administration:**
1. **Buccal:** inside the cheek of an individual's mouth
  2. **Enteral:** by G-tubes, J-tubes or NG tubes

3. **Inhalation:** inhaled into the lungs
  4. **Instillation:** putting a medication into a body orifice
  5. **Oral:** by mouth
  6. **Parenteral:** by an injectable route (intravenous, intramuscular, subcutaneous, intradermal)
  7. **Rectal:** by rectum
  8. **Sublingual:** under the tongue
  9. **Topical:** on top of the skin (produces a local effect)
  10. **Transdermal:** patch on top of the skin (produces a systemic effect)
  11. **Vaginal:** by vagina
- DD. Steven Johnson Syndrome:** a rare, serious disorder in which your skin and mucous membranes react severely to a medication. It begins with flu-like symptoms followed by a painful red or purplish rash that spreads and blisters, eventually causing the top layer of skin to die and shed.
- EE. Tolerance:** a need for increasingly higher doses of a drug/medication to produce the same effect as the first dose or previous doses
- FF. Trade Name (brand name):** name given the drug/medication by the manufacturer; patented name
- GG. 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. Drug handbooks
- B. Facility pharmacist
- C. Drug package inserts
- D. Pharmacology Reference Books
- E. Facility approved individual medication education material
- F. Reliable on-line resources
- G. Physicians Desk Reference (PDR)

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

- A. **Federal Controlled Substances 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 (DEA) enforces this act.

- B. N.C. Controlled Substances 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 medications.
- 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 State Operated Healthcare Facilities (DSOHF) 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 factors which influence medication dosage and response**

- A. Age
- B. Weight
- C. Gender
- D. Time and route of administration
- E. Rate of excretion

- F. Dosage form
- G. Genetic factors
- H. Drug interactions
- I. Condition of the individual
- J. Pregnant or lactating individual



## UNIT 1, SECTION 1: ANTI-INFECTIVES

### A. CLASSIFICATION: ANTI-BACTERIALS

#### INDICATIONS:

1. These drugs are highly effective against infections caused by bacteria.

#### DRUG EXAMPLES:

- Sulfonamides: sulfamethoxazole/trimethoprim (Septra<sup>®</sup>)
- Penicillins: amoxicillin/clavulanate potassium (Augmentin<sup>®</sup>)  
penicillin
- Cephalosporins: ceftriaxine sodium (Rocephin<sup>®</sup>)  
cephalexin monohydrate (Keflex<sup>®</sup>)
- Tetracyclines: doxycycline hydrate (Vibramycin<sup>®</sup>)  
tetracycline
- Fluoroquinolones: ciprofloxacin (Cipro<sup>®</sup>)  
levofloxacin (Levaquin<sup>®</sup>)
- Aminoglycosides: gentamicin
- Macrolides: azithromycin (Zithromax<sup>®</sup>)  
clarithromycin (Biaxin<sup>®</sup>)  
erythromycin
- Miscellaneous: clindamycin phosphate (Cleocin<sup>®</sup>)  
nitrofurantoin (Macrobid<sup>®</sup>)  
vancomycin

#### SIDE EFFECTS/ADVERSE REACTIONS:

*(Items in bold have the potential to be life-threatening)*

- Diarrhea/loose stools
- Skin rashes and urticaria
- Vaginal or oral yeast infections
- Pain at IM site
- Dizziness
- Photosensitivity
- Headache
- Abdominal pain
- Nausea
- Vomiting
- Epigastric distress
- Phlebitis at IV site
- Vestibular reactions
- Drowsiness
- Insomnia

#### NURSING CONSIDERATIONS:

1. Teach to complete entire course of therapy.

## UNIT 1, SECTION 1: ANTI-INFECTIVES

### B. CLASSIFICATION: ANTI-FUNGALS

#### INDICATIONS:

1. These drugs are effective against fungal infections.

#### DRUG EXAMPLES:

- clotrimazole (Lotrimin®)
- fluconazole (Diflucan®)
- ketoconazole (Nizoral®)
- tolnaftate (Tinactin®)

#### SIDE EFFECTS/ADVERSE REACTIONS:

*(Items in bold have the potential to be life-threatening)*

- Dizziness
- Headache
- Abdominal pain
- Anorexia
- Nausea
- Topical:
  - Burning
  - Skin irritation
  - Itching
  - Redness
  - Stinging

#### NURSING CONSIDERATIONS:

1. Fluconazole (Diflucan®) can be given without regard for food.
2. Administer ketoconazole (Nizoral®) with food to decrease nausea.

## UNIT 1, SECTION 1: ANTI-INFECTIVES

### C. CLASSIFICATION: ANTI-VIRALS

#### INDICATIONS:

1. Acyclovir (Zovirax<sup>®</sup>) is used to treat Herpes Simplex Types 1 and 2 and Varicella Zoster.
2. Tamiflu treats uncomplicated acute illness due to influenza infection.
3. Zidovudine (Retrovir<sup>®</sup>) is used to treat or prevent transmission of HIV.

#### DRUG EXAMPLES:

- acyclovir sodium (Zovirax<sup>®</sup>)
- oseltamivir phosphate (Tamiflu<sup>®</sup>)
- zidovudine (Retrovir<sup>®</sup>)

#### SIDE EFFECTS/ADVERSE REACTIONS:

*(Items in bold have the potential to be life-threatening)*

- Dizziness
- Headache
- Diarrhea
- Nausea
- Vomiting
- Weakness
- Abdominal pain
- Anemia
- Granulocytopenia
- Local:
  - Pain
  - Phlebitis

#### NURSING CONSIDERATIONS:

1. These drugs are not cures and do not prevent the spread of infection to others.
2. Retrovir capsules should be swallowed whole.
3. Tamiflu<sup>®</sup> is only effective if started within 48 hours of onset of symptoms.

## UNIT 1, SECTION 1: ANTI-INFECTIVES

### D. CLASSIFICATION: ANTI-MYCOBACTERIALS

#### INDICATIONS:

1. Rifampin is used to treat tuberculosis.
2. INH may be used for TB prophylaxis

#### DRUG EXAMPLES:

- isoniazid (INH<sup>®</sup>)
- rifampin (Rifadin<sup>®</sup>)

#### SIDE EFFECTS/ADVERSE REACTIONS:

*(Items in bold have the potential to be life-threatening)*

- Hepatotoxicity
- Isoniazid (INH<sup>®</sup>): peripheral neuropathy
- Rifampin (Rifampin<sup>®</sup>): abdominal pain  
diarrhea  
flatulence  
heartburn  
nausea  
vomiting  
red discoloration of body fluids (tears, saliva, urine)  
flu-like syndrome

#### NURSING CONSIDERATIONS:

1. Teach the importance of complying with treatment regimen which may take months.
2. Give isoniazid (INH<sup>®</sup>) with meals.

## UNIT 1, SECTION 1: ANTI-INFECTIVES

### E. CLASSIFICATION: ANTIPARASITIC DRUGS

#### INDICATIONS:

1. Lindane (Kwell Shampoo/lotion<sup>®</sup>) is used to treat pediculosis and scabies.
2. Metronidazole (Flagyl<sup>®</sup>) is used to treat amebic hepatic abscesses, intestinal amebiasis and trichomoniasis.

#### DRUG EXAMPLES:

- lindane (Kwell Shampoo/lotion<sup>®</sup>)
- metronidazole (Flagyl<sup>®</sup>)

#### SIDE EFFECTS/ADVERSE REACTIONS:

*(Items in bold have the potential to be life-threatening)*

- lindane (Kwell Shampoo/lotion<sup>®</sup>): **Seizures**  
Headache  
Nausea/vomiting  
Contact dermatitis  
Local irritation
- metronidazole (Flagyl<sup>®</sup>): Dizziness  
Headache  
Abdominal pain  
Anorexia  
Nausea  
Metallic taste

#### NURSING CONSIDERATIONS:

1. Metronidazole (Flagyl<sup>®</sup>) should be given with meals.
2. Individuals taking metronidazole (Flagyl<sup>®</sup>) should avoid drinking alcoholic beverages or medications containing alcohol due to disulfiram like adverse reactions.
3. Follow instructions on lindane (Kwell Shampoo/lotion<sup>®</sup>) for proper application, waiting the recommended time before rinsing, and to avoid overuse or toxicity which could result in seizures.

## UNIT I, SECTION 2: ANTI-INFLAMMATORY DRUGS

### A. CLASSIFICATION: NON-STEROIDALS

#### INDICATIONS:

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

#### DRUG EXAMPLES:

- celecoxib (Celebrex<sup>®</sup>)
- ibuprofen (Motrin<sup>®</sup>, Advil<sup>®</sup>, Nuprin<sup>®</sup>)
- naproxen (Aleve<sup>®</sup>, Naprosyn<sup>®</sup>)
- indomethacin (Indocin<sup>®</sup>)
- meloxicam (Mobic<sup>®</sup>)

#### SIDE EFFECTS/ADVERSE REACTIONS:

*(Items in bold have the potential to be life-threatening)*

- Headache
- GI upset/bleed
- Diarrhea
- Constipation
- **Steven-Johnson Syndrome**

#### NURSING CONSIDERATIONS:

1. Take oral doses with food to avoid gastric irritation.
2. Anti-hypertensives reduce the effectiveness of medication.
3. Avoid Aspirin use due to the increased risk of bleeding and it may also mask signs of infection.

## UNIT I, SECTION 2: ANTI-INFLAMMATORY DRUGS

### B. CLASSIFICATION: CORTICOSTEROIDS

#### INDICATIONS:

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

#### DRUG EXAMPLES:

- hydrocortisone acetate (Anusol-HC<sup>®</sup>)
- methylprednisolone (Medrol<sup>®</sup>)
- triamcinolone (Aristocort<sup>®</sup>, Kenacort<sup>®</sup>, Kenalog<sup>®</sup>)
- hydrocortisone
- prednisone
- betamethasone (Diprolene<sup>®</sup>)
- budesonide (Pulmicort Respules<sup>®</sup>)

#### SIDE EFFECTS/ADVERSE REACTIONS:

*(Items in bold have the potential to be life-threatening)*

- Euphoria
- Insomnia
- Peptic ulceration
- Mood swings
- Bone loss (oral steroids)
- Sodium retention

#### NURSING CONSIDERATIONS:

1. These drugs often mask the severity of illnesses.
2. Take oral doses with food when possible to avoid gastric irritation.
3. **SUDDEN WITHDRAWAL FROM THESE DRUGS MAY BE FATAL:**  
**CAUTION NOT** to discontinue drug therapy abruptly.
4. Warn individuals with arthritis **NOT** to overuse the affected joint while taking these medications in order to avoid permanent joint damage.
5. Rinse the mouth after using inhaled corticosteroid medications to prevent an oral yeast infection.
6. May affect blood sugar.

## UNIT 1, SECTION 3: AUTONOMIC DRUGS

### A. CLASSIFICATION: ANTI-PARKINSON DRUGS

#### INDICATIONS:

1. Used to treat Parkinson's disease and extrapyramidal reactions associated with the use of antipsychotics such as drooling, thick tongue, slurred speech and abnormal movements.

#### DRUG EXAMPLES:

- amantadine hydrochloride (Symmetrel<sup>®</sup>)
- benztropine mesylate (Cogentin<sup>®</sup>)
- bromocriptine mesylate (Parlodel<sup>®</sup>, Dopamine Receptor Agonist)
- diphenhydramine hydrochloride (Benadryl<sup>®</sup>)
- levodopa (Larodopa<sup>®</sup>)
- pramipexole dihydrochloride (Mirapex<sup>®</sup>)
- ropinirole hydrochloride (Requip<sup>®</sup>)
- selegiline hydrochloride (Eldepryl<sup>®</sup>)
- trihexyphenidyl hydrochloride (Artane<sup>®</sup>)
- carbidopa/levodopa (Sinemet<sup>®</sup>)

#### SIDE EFFECTS/ADVERSE REACTIONS:

*(Items in bold have the potential to be life-threatening)*

- Nervousness
- Dizziness
- Headaches
- Psychotic symptoms - hallucinations, delusions, amnesia, restlessness, may increase sensitivity to tardive dyskinesia (TD)
- Tachycardia
- Hypotension
- Dry mouth
- Nausea
- Constipation
- Urinary hesitancy or retention
- Lack of sweat; abnormal deficiency of sweat

#### NURSING CONSIDERATIONS:

1. Benztropine mesylate (Cogentin<sup>®</sup>) and trihexyphenidyl hydrochloride (Artane<sup>®</sup>) may be abused; therefore, monitor for signs of abuse (ex. asking



for more frequently than ordered) and simulating EPS (extrapyramidal symptoms).

2. Monitor diabetics taking trihexyphenidyl hydrochloride (Artane<sup>®</sup>) liquid because it contains sugar.
3. When administering with an antipsychotic, monitor closely for anticholinergic symptoms (ex. urinary retention, dry mouth).

## UNIT 1, SECTION 3: AUTONOMIC DRUGS

### B. CLASSIFICATION: SKELETAL MUSCLE RELAXANTS

#### INDICATIONS:

1. Used to treat painful musculoskeletal disorders (ex. back injuries)
2. Some are used to treat spasticity
3. Can be used as adjunct to anesthesia and ECT

#### DRUG EXAMPLES:

- atracurium besylate (Tracrium<sup>®</sup>)
- baclofen (Lioresal<sup>®</sup>)
- chlorzoxazone (Parafon Forte DSC<sup>®</sup>, Paraflex<sup>®</sup>)
- cyclobenzaprine (Flexeril<sup>®</sup>)
- dantrolene sodium (Dantrium<sup>®</sup>)
- \*diazepam (Valium<sup>®</sup>)
- methocarbamol (Robaxin<sup>®</sup>)
- tizanidine hydrochloride (Zanaflex<sup>®</sup>)

#### SIDE EFFECTS/ADVERSE REACTIONS:

*(Items in bold have the potential to be life-threatening)*

- Drowsiness
- Insomnia
- Dizziness
- Muscle incoordination
- Decreased blood pressure
- Tachycardia
- **Bradycardia**
- GI upset
- Dry mouth
- Urine color changes
- Increased liver enzymes
- Decreased respirations

#### NURSING CONSIDERATIONS:

1. Assess individuals with epilepsy, who are taking dantrolene sodium (Dantrium<sup>®</sup>) or baclofen (Lioresal<sup>®</sup>) for increased incidence of seizures.
2. Monitor individual's vital signs.
3. **DO NOT** withdraw baclofen (Lioresal<sup>®</sup>) abruptly unless required for severe adverse reactions because it may precipitate hallucinations.

\*See section on Antianxiety Drugs, Benzodiazepines for information on diazepam (Valium<sup>®</sup>).

## UNIT 1, SECTION 4: BLOOD FORMATION, COAGULATION, AND THROMBOSIS

### A. CLASSIFICATION: ANTICOAGULANTS

#### INDICATIONS:

1. Anticoagulants are used for deep vein thrombosis, pulmonary emboli, myocardial infarction, open heart surgery, disseminated intravascular coagulation (DIC), atrial fibrillation with embolization, transfusion, and dialysis.

#### DRUG EXAMPLES:

- clopidogrel bisulfate (Plavix<sup>®</sup>)
- enoxaparin sodium (Lovenox<sup>®</sup>)
- heparin sodium (Hep-Lock<sup>®</sup>, HepFlush<sup>®</sup>-10)
- warfarin sodium (Coumadin<sup>®</sup>)
- dabigatran (Pradaxa<sup>®</sup>)

#### SIDE EFFECTS/ADVERSE REACTIONS:

*(Items in bold have the potential to be life-threatening)*

- Prolonged clotting time
- **Neutropenia**
- **Agranulocytosis**
- **Hematuria**
- Fever
- Rash
- Diarrhea
- **Hemorrhage/epistaxis**

#### NURSING CONSIDERATIONS:

1. Medication should be given at the same time each day.
2. Heparin sodium:
  - Give between iliac crests in lower abdomen, deep into subcutaneous fat
  - Leave needle in place for 10 seconds after injecting, then withdraw the needle;
  - Rotate sites
  - DO NOT massage the area or aspirate
  - Watch for signs of bleeding at injection site
3. Enoxaparin sodium (Lovenox<sup>®</sup>):
  - Give in stomach area (right or left side) at least 2 inches from 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 massage the area or aspirate
4. Avoid all IM injections that may cause bleeding.
  5. Avoid OTC medications unless ordered by medical provider.
  6. Eating different amounts of leafy, green vegetables may alter anticoagulant effect.
  7. Teach to use soft bristle tooth brush and electric razor for shaving.
  8. Teach to avoid contact sports.
  9. Teach to wear a Medi-alert bracelet or carry a card at all times and inform dentist and/or other medical providers.

**UNIT 1, SECTION 4: BLOOD FORMATION, COAGULATION, AND THROMBOSIS**

**B. CLASSIFICATION: COAGULANTS (HEPARIN AND WARFARIN ANTAGONISTS)**

**INDICATIONS:**

1. These drugs are used to treat heparin calcium, heparin sodium or warfarin overdose, hemorrhage, and/or capillary bleeding.

**DRUG EXAMPLES:**

- protamine sulfate (Heparin<sup>®</sup> antagonist)
- phytonadione - Vitamin K – (Warfarin<sup>®</sup> antagonist)

**SIDE EFFECTS/ADVERSE REACTIONS:**

*(Items in bold have the potential to be life-threatening)*

- Bradycardia
- **Circulatory collapse**
- **Pulmonary edema**
- **Acute pulmonary hypertension**

**NURSING CONSIDERATIONS:**

1. Assess for spontaneous bleeding, particularly with those who have had recent cardiac surgery, on dialysis, or are receiving increased doses of anticoagulants.
2. Assess for allergies to fish - may cause hypersensitive reaction in patients allergic to fish.

**UNIT 1, SECTION 4: BLOOD FORMATION, COAGULATION, AND THROMBOSIS**

**C. CLASSIFICATION: ANTIANEMIAS (HEMATINICS)**

**INDICATIONS:**

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

**DRUG EXAMPLES:**

- ferrous sulfate (Feosol<sup>®</sup>, Fer-In-Sol<sup>®</sup>, Nu-iron<sup>®</sup>)
- epoetin Alfa (Epogen<sup>®</sup>, Procrit<sup>®</sup>)

**SIDE EFFECTS/ADVERSE REACTIONS:**

*(Items in bold have the potential to be life-threatening)*

- Headache
- Paresthesis
- Dizziness
- Hyper/hypotension
- Constipation
- **Seizures**
- **DVT**
- **CHF**
- Black tarry stools
- Irritation or phlebitis at injection site
- Fatigue
- Pyrexia
- Pharyngitis
- Edema
- Abdominal pain

**NURSING CONSIDERATIONS:**

1. Give oral tablets with orange juice and dilute liquid preparations in orange juice to help promote absorption. **DO NOT** administer with milk or antacids.
2. Give liquid preparations through a straw to avoid staining teeth.
3. Do not crush tablets. Should be swallowed whole.
4. Stay upright for 30 minutes after taking medication to prevent esophageal corrosion.

## UNIT I, SECTION 5:       CARDIOVASCULAR SYSTEM DRUGS

### A.     CLASSIFICATION:     CARDIAC GLYCOSIDES

#### INDICATIONS:

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

#### DRUG EXAMPLES:

- digoxin (Lanoxin<sup>®</sup>)

#### SIDE EFFECTS/ADVERSE REACTIONS:

*(Items in bold have the potential to be life-threatening)*

- Headache
- Drowsiness
- Dizziness
- Hypotension
- **Dysrhythmias**
- Bradycardia
- Yellow-green halos around visual images
- Photophobia, double vision
- Nausea
- Vomiting
- Diarrhea

#### NURSING CONSIDERATIONS:

1. **Check apical pulse for 1 minute before giving; if pulse <60 in adult, take again in one hour; if < 60 withhold and notify the medical provider.**
2. Monitor weight regularly.
3. Monitor apical pulse, character, rate, rhythm to assess cardiac functioning.
4. Teach **NOT** to stop drug abruptly.
5. Avoid taking antacids at the same time.
6. Teach to keep tablets in light resistant containers.

## UNIT I, SECTION 5:       CARDIOVASCULAR SYSTEM DRUGS

### B.     CLASSIFICATION:     ANTIARRHYTHMIC DRUGS

#### INDICATIONS:

1. These drugs are used to prevent and treat atrial and ventricular arrhythmias, including those secondary to a myocardial infarction.
2. **Propranolol hydrochloride (Inderal®)** may also be ordered for treatment of aggression, tremors associated with Lithium, and akathisia associated with antipsychotic medication (unlabelled use).

#### DRUG EXAMPLES:

- Anti-anginal Beta Blockers:       propranolol hydrochloride (Inderal®)
- Anti-cholinergic Parasympatholytics:   atropine sulfate
- Anti-dysrhythmics:   adenosine (Adenocard®)  
                                  disopyramide (Norpace®)  
                                  lidocaine hydrochloride (Xylocaine®)  
                                  procainamide hydrochloride (Pronestyl®)  
                                  quinidine

#### SIDE EFFECTS/ADVERSE REACTIONS:

*(Items in bold have the potential to be life-threatening)*

- |                                   |                                   |
|-----------------------------------|-----------------------------------|
| • Dizziness                       | • Agitation                       |
| • Depression                      | • Fatigue                         |
| • Syncope                         | • Tremors                         |
| • Delirium                        | • Insomnia                        |
| • Hypotension                     | • <b>Congestive heart failure</b> |
| • Angina                          | • Blurred vision                  |
| • Nausea                          | • Vomiting                        |
| • Urinary retention and hesitancy | • <b>Agranulocytosis</b>          |

#### NURSING CONSIDERATIONS:

1. **Check apical pulse for 1 minute before giving; if pulse <60 in adult, take again in one hour; if < 60 withhold and notify the medical provider.**
2. Obtain baseline pulse, report changes in rate, rhythm, and quality.
3. Blood pressure: check for hypo- and hypertension.
4. Respiratory status: Rate, rhythm, and lung fields for crackles.



## UNIT I, SECTION 5:       CARDIOVASCULAR SYSTEM DRUGS

### C.     CLASSIFICATION:     DIURETICS

#### INDICATIONS:

1. Reduces the body's total volume of water and salt by blocking sodium and water reabsorption in the renal tubules.

#### DRUG EXAMPLES:

- Thiazides:    chlorothiazide (Diuril<sup>®</sup>)  
                  hydrochlorothiazide (Microzide<sup>®</sup>)
- Loop:        furosemide (Lasix<sup>®</sup>)  
                  torsemide (Demadex<sup>®</sup>)  
                  bumetanide (Bumex<sup>®</sup>)
- Potassium-Sparing:    spironolactone (Aldactone<sup>®</sup>)  
                              triamterene/HCTZ (Dyazide<sup>®</sup>, Maxide<sup>®</sup>)  
                              amiloride (Midamor<sup>®</sup>)  
                              eplerenone (Inspra<sup>®</sup>)

#### SIDE EFFECTS/ADVERSE REACTIONS:

*(Items in bold have the potential to be life-threatening)*

- **Aplastic anemia**
- **Agranulocytosis**
- **Leukopenia**
- Drowsiness
- Headaches
- Dizziness
- Confusion
- **Dehydration**
- Orthostatic hypotension
- Nausea
- Hyperglycemia

#### NURSING CONSIDERATIONS:

1. Monitor elderly for excessive diuresis/dehydration.
2. Teach to eat foods high in potassium (e.g., bananas, potatoes, citrus fruits) if taking a potassium wasting diuretic.
3. Teach to avoid over-the-counter (OTC) drugs unless ordered by the medical provider.
4. Teach to use sunscreen.
5. Teach diabetics to monitor blood glucose level closely.



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

### **E.        CLASSIFICATION:        VASODILATORS**

#### **INDICATIONS:**

1. Vasodilators are used to treat hypertension, angina, muscular ischemia, vasospasm, ischemic cerebrovascular disease, intermittent claudication, and arteriosclerosis obliterans

#### **DRUG EXAMPLES:**

- Nitrates:        isosorbide dinitrate (Iso-Bid<sup>®</sup>, Isordil<sup>®</sup>, Sorbitrate<sup>®</sup>)  
                  nitroglycerin (Nitrostat<sup>®</sup>, Nitro-Bid<sup>®</sup>, Nitrol Ointment<sup>®</sup>)
- Calcium Channel Blockers:        amlodipine (Norvasc<sup>®</sup>)  
  diltiazem hydrochloride (Cardizem<sup>®</sup>)  
  nifedipine (Procardia<sup>®</sup>)  
  verapamil hydrochloride (Calan<sup>®</sup>)

#### **SIDE EFFECTS/ADVERSE REACTIONS:**

*(Items in bold have the potential to be life-threatening)*

- Dizziness
- Light-headedness
- Headache
- Weakness
- Peripheral edema
- Hypotension
- Palpitations
- Tachycardia
- Nasal stuffiness
- Rash
- Leg cramps
- Constipation

#### **NURSING CONSIDERATIONS:**

1. Monitor blood pressure, pulse and respirations.
2. Wear gloves when applying patches. Rotate application sites. Discard patches according to facility policy/procedure.
3. Teach to store in dark container at room temperature.



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

### **G.      CLASSIFICATION:      ANTILIPIDEMICS**

#### **INDICATIONS:**

1. 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.

#### **DRUG EXAMPLES:**

- Anti-lipidemics:      colestyramine (Questran<sup>®</sup>)  
                              colestipol hydrochloride (Colestid<sup>®</sup>)  
                              gemfibrozil (Lopid<sup>®</sup>)  
                              nicacin (Niaspan<sup>®</sup>)
- Cholesterol Lowering Agent (Statins):      atorvastatin Calcium (Lipitor<sup>®</sup>)  
  ezetimibe (Zetia<sup>®</sup>)  
  pravastatin sodium (Pravachol<sup>®</sup>)  
  rosuvastatin calcium (Crestor<sup>®</sup>)  
  simvastatin (Zocor<sup>®</sup>)

#### **SIDE EFFECTS/ADVERSE REACTIONS:**

*(Items in bold have the potential to be life-threatening)*

- Dizziness
- Fatigue weakness
- Headache
- Insomnia
- **Dysrhythmias**
- Abdominal discomfort
- Steatorrhea (excess fat in feces)
- Nausea
- Vomiting
- Rashes
- Hyperglycemia
- Jaundice

#### **NURSING CONSIDERATIONS:**

1. Teach to report to medical provider muscle pain or weakness, yellow skin or eyes, severe abdominal pain, or dark colored urine.
2. Teach to eat diet low in fat.
3. Teach to take medication in evening in order to get full benefit.

## UNIT 1, SECTION 6: CENTRAL NERVOUS SYSTEM DRUGS

### A. CLASSIFICATION: ANTIPSYCHOTICS - NEUROLEPTICS

#### INDICATIONS:

1. These drugs help modify thought disorders, blunted affect, and behaviors associated with psychosis.
2. These agents lessen positive symptoms including paranoia, agitation, hallucinations, delusions, and autistic behavior.
3. The atypical antipsychotics may also decrease negative symptoms (withdrawn behavior), improve cognition, and have fewer side effects than the traditional antipsychotics.

#### DRUG EXAMPLES:

- Typical: chlorpromazine (Thorazine<sup>®</sup>)  
fluphenazine (Prolixin decanoate<sup>®</sup>, Prolixin<sup>®</sup>)  
haloperidol (Haldol decanoate<sup>®</sup>, Haldol<sup>®</sup>)  
loxapine (Loxitane<sup>®</sup>)
- Atypical: aripiprazole (Abilify<sup>®</sup>)  
clozapine (Clozaril<sup>®</sup>)  
olanzapine (Zyprexa<sup>®</sup>)  
quetiapine (Seroquel<sup>®</sup>)  
risperidone (Risperdal<sup>®</sup>, Risperdal Consta<sup>®</sup>)  
ziprasidone (Geodon<sup>®</sup>)  
lurasidone (Latuda<sup>®</sup>)  
asenapine (Saphris<sup>®</sup>)  
iloperidone (Fanapt<sup>®</sup>)  
paliperidone (Invega<sup>®</sup>, Invega Sustenna<sup>®</sup>)

#### SIDE EFFECTS/ADVERSE REACTIONS:

*(Items in bold have the potential to be life-threatening)*

- Dizziness
- Hypertension
- Constipation
- Orthostatic hypotension
- Sedation
- Photosensitivity
- **Seizures**
- **Suicidal ideation**
- Tachycardia
- Insomnia
- Dry mouth
- **Agranulocytosis (with Clozaril<sup>®</sup>)**
- Weight Gain
- **Neuroleptic malignant syndrome (NMS)**
- **Stroke**
- **Leukopenia**

- **Neutropenia**

- **Extrapyramidal symptoms (EPS)**

**NURSING CONSIDERATIONS:**

1. Assess for symptoms of agranulocytosis - sore throat, high fever, nosebleed, and rash.
2. Z-track method recommended for IM injections.
3. Use Clozaril<sup>®</sup> cautiously with Benzodiazepines - may cause respiratory arrest and has high risk of sedation.
4. Teach individual not to combine these drugs with alcohol or other depressants.
5. Teach individual not to stop taking these drugs abruptly.

## UNIT 1, SECTION 6: CENTRAL NERVOUS SYSTEM DRUGS

### B. CLASSIFICATION: ANTIANXIETY DRUGS (ANXIOLYTICS)

#### INDICATIONS:

1. These drugs are used to treat anxiety, agitation, relax skeletal muscles, prevent and treat withdrawal, and supply pre-op medication for general anesthesia.
2. They may also be used to treat rashes.
3. Some of the Benzodiazepines are used to treat seizure disorders (Ativan<sup>®</sup>, Valium<sup>®</sup>).

#### DRUG EXAMPLES:

- Benzodiazepines: alprazolam (Xanax<sup>®</sup>)  
chlordiazepoxide hydrochloride (Librium<sup>®</sup>)  
clonazepam (Klonopin<sup>®</sup>)  
diazepam (Valium<sup>®</sup>)  
lorazepam (Ativan<sup>®</sup>)  
midazolam hydrochloride (Versed<sup>®</sup>)  
hydroxyzine hydrochloride (Vistaril<sup>®</sup>, Atarax<sup>®</sup>)

#### SIDE EFFECTS/ADVERSE REACTIONS:

*(Items in bold have the potential to be life-threatening)*

- Drowsiness/lethargy
- Dry mouth
- Insomnia
- Dizziness
- Depression
- **Respiratory depression**
- **Cardiac arrest**
- Confusion
- Diarrhea
- Irritability
- Impaired coordination
- **Suicidal ideation**
- **Apnea**
- **Bronchospasm**

#### NURSING CONSIDERATIONS:

1. Potentially lethal if taken with alcohol and other narcotics.
2. Do not work around dangerous equipment and do not drive 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.
4. Benzodiazepines are the preferred choice in the management of alcohol withdrawal symptoms (formerly called delirium tremens/DT).



## UNIT 1, SECTION 6: CENTRAL NERVOUS SYSTEM DRUGS

### C. CLASSIFICATION: ANTIDEPRESSANTS

#### INDICATIONS:

1. These drugs are used to treat depression, prevent recurrent depression, panic disorders, enuresis in children, pre-menstrual disorders, and obsessive compulsive disorders.

#### DRUG EXAMPLES:

- Tricyclics (TCAs): amitriptyline hydrochloride (Elavil<sup>®</sup>)  
clomipramine hydrochloride (Anafranil<sup>®</sup>)  
doxepin hydrochloride (Sinequan<sup>®</sup>)  
imipramine hydrochloride (Tofranil<sup>®</sup>)
- Selective Serotonin Reuptake Inhibitors (SSRIs): citalopram (Celexa<sup>®</sup>)  
escitalopram (Lexapro<sup>®</sup>)  
fluoxetine (Prozac<sup>®</sup>)  
fluroxamine (Luvox<sup>®</sup>)  
paroxetine (Paxil<sup>®</sup>)  
sertraline (Zoloft<sup>®</sup>)
- Miscellaneous: bupropion hydrochloride (Wellbutrin<sup>®</sup>)  
trazodone (Desyrel<sup>®</sup>)
- Serotonin Norepinephrine Reuptake Inhibitors: venlafaxine (Effexor<sup>®</sup>)  
desvenlafaxine (Pristiq<sup>®</sup>)  
duloxetine (Cymbalta<sup>®</sup>)

#### SIDE EFFECTS/ADVERSE REACTIONS:

*(Items in bold have the potential to be life-threatening)*

- Drowsiness
- Headache
- Tachycardia
- Sexual dysfunction
- Weight gain
- Dry mouth
- **Seizures**
- **Neuroleptics malignant syndrome (NMS)**
- Hemorrhage
- Dizziness
- Insomnia
- Constipation
- Increased appetite
- Orthostatic hypotension
- **Stroke**
- **Coma**
- **Suicidal ideation**

**NURSING CONSIDERATIONS:**

1. Monitor for rapid improvement in mood and energy level. When this occurs, the risk for suicide increases.
2. Therapeutic effects may take 2-3 weeks.
3. Use caution in driving and other activities requiring alertness because of possible drowsiness, dizziness, and blurred vision.
4. Do not withdraw these drugs abruptly.

## UNIT 1, SECTION 6: CENTRAL NERVOUS SYSTEM DRUGS

### D. CLASSIFICATION: ANTIMANIA DRUGS

#### INDICATIONS:

1. These drugs are used to treat and prevent the reoccurrence of acute mania or hypo-manic episodes and mood disorders.

#### DRUG EXAMPLES:

- lithium carbonate (Eskalith<sup>®</sup>, Lithotab<sup>®</sup>, Lithobid<sup>®</sup>)
- lithium citrate
- carbamazepine (Tegretol<sup>®</sup>)
- valproic acid (Depakene<sup>®</sup>)
- divalproex sodium (Depakote<sup>®</sup>, Depakote ER<sup>®</sup>)

#### SIDE EFFECTS/ADVERSE REACTIONS:

*(Items in bold have the potential to be life-threatening)*

- Fatigue
- Diplopia
- Dysmenorrhea
- Anorexia
- Thirst
- Rash
- **Seizures**
- **Suicidal ideation**
- Muscle weakness
- Blurred vision
- Vomiting
- Diarrhea
- Polyuria
- **Coma**
- **Arrhythmias**
- **Stevens-Johnson syndrome**

#### NURSING CONSIDERATIONS:

1. Monitor and teach for signs of lithium toxicity: persistent diarrhea, vomiting or severe nausea, coarse trembling of hands or legs, frequent muscle twitching such as pronounced jerking of arms and legs, blurred vision, marked dizziness, difficulty walking, slurred speech, irregular heart beat, swelling of the feet/lower legs.
2. Monitor and encourage adequate amount of fluids.
3. Monitor for salt intake - low salt diets can be dangerous leading to lithium toxicity.
4. Weigh routinely to monitor for weight gain and edema.

## UNIT 1, SECTION 6: CENTRAL NERVOUS SYSTEM DRUGS

### E. CLASSIFICATION: PSYCHOSTIMULANTS

#### INDICATIONS:

1. These drugs may be used for treatment of narcolepsy, attention deficit/hyperactivity disorder (ADHD), depression in medically ill elderly patients/individuals, and alleviation of neurobehavioral symptoms of traumatic brain injury (TBI).

#### DRUG EXAMPLES:

- caffeine (No Doz<sup>®</sup>, Vivarin<sup>®</sup>)
- methylphenidate hydrochloride (Ritalin<sup>®</sup>, Concerta<sup>®</sup>)
- amphetamine & Dextroamphetamine (Adderall<sup>®</sup>)
- atomoxetine Hydrochloride (Strattera<sup>®</sup>)
- lisdexamfetamine (Vyvanase<sup>®</sup>)
- methylphenidate transdermal patch (Daytrana<sup>®</sup>)

#### SIDE EFFECTS/ADVERSE REACTIONS:

*(Items in bold have the potential to be life-threatening)*

- Insomnia
- Headache
- Dizziness
- Nervousness
- Palpitations/tachycardia
- Hyper/hypotension
- Dry mouth
- Weight loss/decreased appetite
- Abdominal pain
- Constipation
- **Seizures**
- **Neuroleptic malignant syndrome**

#### NURSING CONSIDERATIONS:

1. Limit caffeine consumption which may increase irritability and over stimulate.
2. Monitor children and adolescents closely for worsening of condition, weight changes, agitation, irritability, suicidal thinking/behaviors, and unusual changes in behavior, especially the first few months of therapy or when dosage is increased or decreased.
3. These drugs have a high abuse potential and may cause dependence.

## UNIT 1, SECTION 6: CENTRAL NERVOUS SYSTEM DRUGS

### F. CLASSIFICATION: ANTICONVULSANTS

#### INDICATIONS:

1. These drugs primarily control seizure disorders by preventing or reducing the frequency and severity of seizures.

#### DRUG EXAMPLES:

- carbamazepine (Tegretol<sup>®</sup>)
- clonazepam (Klonopin<sup>®</sup>)
- divalproex sodium (Depakote<sup>®</sup>)
- fosphenitoin sodium (Cerebyx<sup>®</sup>)
- gabapentin (Neurontin<sup>®</sup>)
- lamotrigine (Lamictal<sup>®</sup>)
- levetiracetam (Keppra<sup>®</sup>)
- oxcarbazepine (Trileptal<sup>®</sup>)
- phenobarbital
- phenytoin (Dilantin<sup>®</sup>)
- primidone (Mysoline<sup>®</sup>)
- tiagabine hydrochloride (Gabitril<sup>®</sup>)
- topiramate (Topamax<sup>®</sup>)
- valproic acid (Depakene<sup>®</sup>)
- zonisamide (Zonegran<sup>®</sup>)
- lacosamide (Vimpat<sup>®</sup>)
- clobazam (Onfi<sup>®</sup>)

#### SIDE EFFECTS/ADVERSE REACTIONS:

*(Items in bold have the potential to be life-threatening)*

- Drowsiness
- Constipation
- Rash
- Dyspepsia
- **Stevens-Johnson syndrome**
- Ataxia
- Gingival hypertrophy (Dilantin<sup>®</sup>)
- Dizziness
- Blurred vision
- **Suicidal ideation**

#### NURSING CONSIDERATIONS:

1. Assess for life threatening blood dyscrasias and bone marrow depression (sore throat, bruises, fever, and nosebleed).
2. Do not stop taking these drugs abruptly.
3. For Dilantin<sup>®</sup>: take preferably on an empty stomach. If individual is on continuous tube feedings, stop feeding for 1-2 hours before and 1-2 hours after medication is given or as ordered by medical provider (tube feeding binds with medication causing a decreased effect of the drug). Good oral hygiene is important to keep gum tissue from growing over teeth.
4. Lamictal<sup>®</sup> may cause a life-threatening rash.

## UNIT 1, SECTION 6: CENTRAL NERVOUS SYSTEM DRUGS

### G. CLASSIFICATION: ANTI-ALZHEIMER'S AGENTS

#### INDICATIONS:

1. These drugs are used to treat mild to moderate dementia of Alzheimer's disease.

#### DRUG EXAMPLES:

- donepezil (Aricept<sup>®</sup>)
- rivastigmine (Exelon<sup>®</sup>)
- galantamine (Razadyne<sup>®</sup>)
- memantine (Namenda<sup>®</sup>)

#### SIDE EFFECTS/ADVERSE REACTIONS:

*(Items in bold have the potential to be life-threatening)*

- Insomnia
- Nausea
- Vomiting
- Diarrhea
- Constipation
- Tremors
- **Seizures**

#### NURSING CONSIDERATIONS:

1. Assess the frequency and duration of the individual's cognitive and non-cognitive symptoms.
2. Educate individual and caregiver that these drugs are not a cure but will help improve memory, attention, reason, language and ability to perform simple tasks.
3. Administer with meals to minimize gastrointestinal side effects.

## UNIT 1, SECTION 6: CENTRAL NERVOUS SYSTEM DRUGS

### H. CLASSIFICATION: SEDATIVES/HYPNOTICS

#### INDICATIONS:

1. These drugs are used to treat insomnia and promote sleep.

#### DRUG EXAMPLES:

- chloral hydrate
- temazepam (Restoril<sup>®</sup>)
- zolpidem tartrate (Ambien<sup>®</sup>)
- eszopiclone (Lunesta<sup>®</sup>)

#### SIDE EFFECTS/ADVERSE REACTIONS:

*(Items in bold have the potential to be life-threatening)*

- Drowsiness
- Depression
- Headache
- Diarrhea
- **Depression**
- **Suicidal ideation**

#### NURSING CONSIDERATIONS:

1. Monitor for falls due to sedative effects of medications.
2. Assess for carry over effect the next day (difficulty waking up, drowsiness during the day, difficulty with coordination).

## UNIT 1, SECTION 6: CENTRAL NERVOUS SYSTEM DRUGS

### I. CLASSIFICATION: ANALGESICS - NARCOTIC AND OPIOID ANALGESICS

#### INDICATIONS:

1. These drugs relieve moderate to severe pain.

#### DRUG EXAMPLES:

- codeine sulfate
- fentanyl Transdermal (Duragesic<sup>®</sup>)
- hydromorphone hydrochloride (Dilaudid<sup>®</sup>)
- meperidine hydrochloride (Demerol<sup>®</sup>)
- morphine sulfate
- oxycodone hydrochloride (Oxycontin<sup>®</sup>)
- tramadol hydrochloride (Ultram<sup>®</sup>)
- combination products: Percocet<sup>®</sup>  
Tylenol #3<sup>®</sup>  
Lortab<sup>®</sup>  
Vicodin<sup>®</sup>

#### SIDE EFFECTS/ADVERSE REACTIONS:

*(Items in bold have the potential to be life-threatening)*

- Sedation
- Euphoria
- Blurred vision
- Urinary retention
- Diaphoresis
- **Neuroleptic malignant syndrome (NMS)**
- **Respiratory depression**
- Mental clouding
- Hypotension
- Constipation
- GI bleeding
- **Seizures**
- **Stevens-Johnson syndrome**
- **Respiratory/cardiac arrest**

#### NURSING CONSIDERATIONS:

1. Monitor closely in individuals with head injury, pulmonary disease, and decreased respirations.
2. Individuals taking these drugs may require laxative or stool softeners to prevent/relieve constipation.



## UNIT 1, SECTION 6: CENTRAL NERVOUS SYSTEM DRUGS

### J. CLASSIFICATION: ANALGESICS: NON-NARCOTIC ANALGESICS, NON-STEROIDAL ANTI-INFLAMMATORY AND ANTIPYRETICS

#### INDICATIONS:

1. These drugs are most frequently used for pain relating to arthritis, menstrual cramps, urinary tract infections, and migraine headaches.
2. Salicylates are also used to reduce fever, to prevent thromboembolic disorders, transient ischemic attacks (TIAs), and to reduce the risk of heart attack.

#### DRUG EXAMPLES:

- acetaminophen (Tylenol<sup>®</sup>)
- phenazopyridine hydrochloride (Azo-Standard<sup>®</sup>, Pyridium<sup>®</sup>)
- salicylates (Aspirin<sup>®</sup>)
- sumatriptan (Imitrex<sup>®</sup>)
- zolmitriptan (Zomig<sup>®</sup>)
- non-steroidal anti-inflammatory agents (NSAIDs): Ibuprofen (Advil<sup>®</sup>)  
Naproxen (Aleve<sup>®</sup>)

#### SIDE EFFECTS/ADVERSE REACTIONS:

*(Items in bold have the potential to be life-threatening)*

- Dizziness
- Anxiety
- Headache
- **Reye's syndrome**
- Depression
- Weakness
- Fatigue
- **Seizures**

#### NURSING CONSIDERATIONS:

1. Salicylates should not be used (unless prescribed by physician) with individuals who have gastric ulcers, GI bleeding, or are on anticoagulant therapy since the risk of bleeding is increased.
2. Do not give oral or rectal acetylsalicylic acid (Aspirin<sup>®</sup>) to children under the age of 12 years because of the risk of developing Reye's syndrome.
3. Warn individuals on acetylsalicylic acid (Aspirin<sup>®</sup>) to report: ringing of the ears, blurred vision, gastric burning, tarry stools, bruising, or skin rashes.
4. High doses of acetaminophen (Tylenol<sup>®</sup>) use can cause liver damage.
5. Teach individuals that when ibuprofen (Advil<sup>®</sup>) is co-administered with lithium, an increase in serum lithium may occur.

## UNIT 1, SECTION 7: RESPIRATORY SYSTEM DRUGS

### A. CLASSIFICATION: EXPECTORANTS AND ANTITUSSIVE PREPARATIONS

#### INDICATIONS:

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

#### DRUG EXAMPLES:

- Expectorants: guaifenesin (Mucinex<sup>®</sup>, Robitussin<sup>®</sup>)
- Antitussives: codeine sulfate  
dextromethorphan hydrobromide (Delsym<sup>®</sup>, Vicks Formula  
44<sup>®</sup>, Robitussin DM<sup>®</sup>)

#### SIDE EFFECTS/ADVERSE REACTIONS:

*(Items in bold have the potential to be life-threatening)*

- Drowsiness
- Dizziness
- Nausea
- **Seizures**
- **Respiratory depression**

#### NURSING CONSIDERATIONS:

1. Use a non-alcohol base for alcoholics and a sugarless base for diabetics.
2. Increase fluid intake and humidity to thin secretions.
3. Monitor characteristics and frequency of cough. Notify the medical provider if cough persists.

## UNIT 1, SECTION 7: RESPIRATORY SYSTEM DRUGS

### B. CLASSIFICATION: BRONCHODILATORS

#### INDICATIONS:

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

#### DRUG EXAMPLES:

- Spasmolytics: aminophylline  
theophylline (Theobid<sup>®</sup>, Theo-Dur<sup>®</sup>, Slo-Bid<sup>®</sup>)
- Adrenergics - Beta 2 Agonists - Short Acting:  
albuterol (Proventil<sup>®</sup>, Ventolin<sup>®</sup>, Accuneb<sup>®</sup>, Volmax<sup>®</sup>)  
levalbuterol hydrochloride (Xopenex<sup>®</sup>)  
isoproterenol hydrochloride (Isuprel<sup>®</sup>)  
metaproterenol sulfate (Alupent<sup>®</sup>, Metaprel<sup>®</sup>)  
terbutaline sulfate (Brethine<sup>®</sup>)
- Adrenergics - Beta 2 Agonists - Long Acting:  
fluticasone propionate/Salmeterol inhalation powder (Advair Diskus<sup>®</sup>)  
salmeterol xinafoate inhalation powder (Serevent Diskus<sup>®</sup>)  
budesonide & formoterol inhalation (Symbicort<sup>®</sup>)
- Anticholinergics: tiotropium bromide (Spiriva<sup>®</sup>)  
ipratropium bromide (Atrovent<sup>®</sup>)
- Mucolytics: acetylcysteine (Mucomyst<sup>®</sup>)

#### SIDE EFFECTS/ADVERSE REACTIONS:

*(Items in bold have the potential to be life-threatening)*

- Tremors
- Anxiety
- Nausea
- Vomiting
- Irritation in the throat
- Tachycardia
- **Bronchospasm**
- **Dyspnea**

**NURSING CONSIDERATIONS:**

1. May cause sleep disturbances.
2. For medication requiring a handi-haler device, place capsule without opening into the base. Use this medication (capsule) only with the Handi-haler inhalation device. Keep capsule in sealed blister pack and remove just before use. \*Capsules are for inhalation only and should not be swallowed.
3. **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 Agonists-long acting: used to provide control of asthma symptoms, not quick relief. Benefits should last up to 12 hours but take longer to begin working.

## UNIT 1, SECTION 7: RESPIRATORY SYSTEM DRUGS

### C. CLASSIFICATION: ANTIHISTAMINES

#### INDICATIONS:

1. These drugs are used to relieve symptoms of allergic reactions and control common cold symptoms.
2. They may also be used to reduce rigidity and drug induced extrapyramidal reactions as well as for control of nausea and vomiting.

#### DRUG EXAMPLES:

- Histamine Antagonists: cetirizine hydrochloride (Zyrtec<sup>®</sup>)  
diphenhydramine hydrochloride (Benadryl<sup>®</sup>)  
fexofenadine hydrochloride (Allegra<sup>®</sup>)  
loratidine (Claritin<sup>®</sup>)
- Leukotriene Inhibitor: monotelukast sodium (Singular<sup>®</sup>)

#### SIDE EFFECTS/ADVERSE REACTIONS:

*(Items in bold have the potential to be life-threatening)*

- Drowsiness
- Headache
- Thickening of bronchial secretions
- Dizziness
- **Agranulocytosis**
- Fatigue
- Dry mouth
- Urinary retention
- **Seizures**
- Abdominal pain
- Cough

#### NURSING CONSIDERATIONS:

1. Teach to avoid alcohol, caffeine, and environmental irritants.
2. Teach to use OTC medications cautiously.
3. Teach to avoid using oral and topical Benadryl<sup>®</sup> together.

**UNIT 1, SECTION 8: EYE, EAR, NOSE, THROAT/MOUTH PREPARATIONS**

**A. CLASSIFICATION: EYE PREPARATIONS**

**INDICATIONS:**

1. These drugs can be used to treat infection/inflammation/allergies, glaucoma, ocular congestion, and pain.
2. May also be used to lubricate the eyes and aid in the removal of foreign bodies.
3. Miotics are used to treat open-angle glaucoma by decreasing intraocular pressure.
4. Mydriatics are used in acute inflammation of the iris and diagnostic procedures.

**DRUG EXAMPLES:**

- gentamycin sulfate (Garamycin®)
- erythromycin
- prednisone sodium phosphate (Pred Forte®)
- betaxolol (Beta Optic S®)
- atropine sulfate (Isopto Atropine®)
- olopatadine (Patanol®)
- tetrahydrozoline hydrochloride (Visine®)
- timolol (Timoptic®)
- moxifloxacin (Vigamox®)
- ciprofloxacin (Ciloxin®)

**SIDE EFFECTS/ADVERSE REACTIONS:**

*(Items in bold have the potential to be life-threatening)*

- Burning, redness, itching of the eyes
- Iris discoloration
- Dizziness
- Hypotension
- Flushing
- Eyelash growth or darkening
- Headache
- Syncope
- Hypertension
- Tachycardia

**NURSING CONSIDERATIONS:**

1. Miotics constrict the pupils; mydriatics dilate the pupils.
2. Dark glasses should be worn to decrease photosensitivity.
3. **Wait at least 5 minutes between administration of multiple eye drops.**
4. Remove contact lens before administration.

**UNIT 1, SECTION 8:      EYE, EAR, NOSE, THROAT/MOUTH  
PREPARATIONS**

**B.      CLASSIFICATION:      EAR PREPARATIONS**

**INDICATIONS:**

1. These drugs are used to destroy or inhibit bacteria in the ear, emulsify and disperse of accumulated wax in the ear, and relieve ear pain.

**DRUG EXAMPLES:**

- hydrocortisone/neomycin/polymyxin B (Cortisporin Otic<sup>®</sup>)
- ciprofloxacin/hydrocortisone
- carbamide peroxide (Debrox<sup>®</sup>)
- acetic Acid
- antipyrine/benzocaine (A/B otic<sup>®</sup>)

**SIDE EFFECTS/ADVERSE REACTIONS:**

*(Items in bold have the potential to be life-threatening)*

- Itching and ear irritation

**NURSING CONSIDERATIONS:**

1. Instill the drops by allowing the drops to trickle down the ear canal.
2. Warming ear drops to body temperature will decrease pain when administering the drops.
3. To open the ear canal on an adult, pull ear lobe up and back.
4. To open the ear canal on a child, pull ear lobe down and forward.

**UNIT 1, SECTION 8:      EYE, EAR, NOSE, THROAT/MOUTH  
PREPARATIONS**

**C.      CLASSIFICATION:      NASAL PREPARATIONS**

**INDICATIONS:**

1. These medications relieve nasal congestion and allergic rhinitis, and moisturize nasal passages.

**DRUG EXAMPLES:**

- beclomethasone dipropionate (Beconase AQ<sup>®</sup>)
- fluticasone propionate (Flonase<sup>®</sup>)
- oxymetazoline hydrochloride (Afrin<sup>®</sup>)
- phenylephrine hydrochloride (Neosynephrine<sup>®</sup>)
- sodium chloride (Ayr<sup>®</sup>)

**SIDE EFFECTS/ADVERSE REACTIONS:**

*(Items in bold have the potential to be life-threatening)*

- Mucosal irritation
- Headache
- Nervousness
- Tachycardia
- Palpitations

**NURSING CONSIDERATIONS:**

1. DO NOT contaminate the dropper/sprayer by touching it to the nostril.
2. Teach to avoid use for prolonged periods or excessive dosages. May result in swelling of the nasal mucosa, rebound congestion and bleeding.



**UNIT 1, SECTION 8: EYE, EAR, NOSE, THROAT/MOUTH PREPARATIONS**

**D. CLASSIFICATION: THROAT/MOUTH PREPARATIONS**

**INDICATIONS:**

1. These medications are used to relieve sore throat, numb the throat/mouth, and treat thrush and oral lesions.

**DRUG EXAMPLES:**

- phenol/sodium phenolate (Chloraseptic Spray<sup>®</sup>)
- benzocaine (Oral-gel<sup>®</sup>, Spec-T<sup>®</sup>)
- nystatin (Mycostatin<sup>®</sup>)
- triamcinolone acetonide (Kenalog<sup>®</sup>, Artrocort<sup>®</sup> in topical preparation)

**SIDE EFFECTS/ADVERSE REACTIONS:**

*(Items in bold have the potential to be life-threatening)*

- Dizziness
- Headache
- Edema
- Bleeding of the nose
- Nausea
- Vomiting
- Diarrhea

**NURSING CONSIDERATIONS:**

1. Teach to practice good mouth care/oral hygiene.
2. Avoid acidic foods when treating oral lesions.

## UNIT 1, SECTION 9: GASTROINTESTINAL SYSTEM DRUGS

### A. CLASSIFICATION: ANTACIDS and ANTIFLATULENTS

#### INDICATIONS:

1. Antacids reduce total acid load in the GI tract, help to control ulcer pain, and treat gaseous distention and heartburn due to reflux esophagitis.
2. Antiflatulants are used to alleviate and prevent excessive intestinal gas.

#### DRUG EXAMPLES:

- calcium carbonate (Tums<sup>®</sup>, Roloids<sup>®</sup>)
- simethicone
- combination drugs (Maalox Plus<sup>®</sup>, Mylanta<sup>®</sup>)

#### SIDE EFFECTS/ADVERSE REACTIONS:

*(Items in bold have the potential to be life-threatening)*

- Acid rebound
- Constipation

#### NURSING CONSIDERATIONS:

1. **DO NOT** give antacids 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.

## UNIT 1, SECTION 9: GASTROINTESTINAL SYSTEM DRUGS

### B. CLASSIFICATION: ANTIDIARRHEALS

#### INDICATIONS:

1. These drugs are used to control diarrhea.

#### DRUG EXAMPLES:

- bismuth subsalicylate (Pepto-Bismol<sup>®</sup>)
- diphenoxylate hydrochloride with atropine sulfate (Lomotil<sup>®</sup>)
- loperamide (Imodium<sup>®</sup>)

#### SIDE EFFECTS/ADVERSE REACTIONS:

*(Items in bold have the potential to be life-threatening)*

- Drowsiness
- Dizziness
- Constipation
- Increased flatus
- Dry mouth
- Urinary retention

#### NURSING CONSIDERATIONS:

1. Bismuth subsalicylate contains a large amount of salicylate which may be contraindicated for problems associated with bleeding or Reye's Syndrome in children.

## UNIT 1, SECTION 9: GASTROINTESTINAL SYSTEM DRUGS

### C. CLASSIFICATION: LAXATIVES/STOOL SOFTENERS

#### INDICATIONS:

1. Used to relieve or prevent constipation
2. May be used to soften stools and prevent straining during bowel movements

#### DRUG EXAMPLES:

- psyllium (Metamucil<sup>®</sup>)
- lactulose (Chronulac<sup>®</sup>)
- polyethylene glycol (Miralax<sup>®</sup>)
- magnesium citrate (Citroma<sup>®</sup>)
- milk of magnesium (MOM<sup>®</sup>)
- senna (Senokot<sup>®</sup>)
- bisacodyl (Dulcolax<sup>®</sup>)
- docusate sodium (Colace<sup>®</sup>)

#### SIDE EFFECTS/ADVERSE REACTIONS:

*(Items in bold have the potential to be life-threatening)*

- Dehydration
- Diarrhea
- Nausea
- Abdominal cramps
- Irritation of the colon
- Laxative dependence
- Loss of normal bowel function with excess use

#### NURSING CONSIDERATIONS:

1. Psyllium and polyethylene glycol must be mixed with 8 oz. of fluid of choice.

## UNIT 1, SECTION 9: GASTROINTESTINAL SYSTEM DRUGS

### D. CLASSIFICATIONS: ANTI-EMETICS

#### INDICATIONS:

1. Used to control nausea and vomiting.

#### DRUG EXAMPLES:

- metoclopramide hydrochloride (Reglan<sup>®</sup>)
- ondansetron hydrochloride (Zofran<sup>®</sup>)
- prochlorperazine maleate (Compazine<sup>®</sup>)
- promethazine hydrochloride (Phenergan<sup>®</sup>)

#### SIDE EFFECTS/ADVERSE REACTIONS:

*(Items in bold have the potential to be life-threatening)*

- Tardive dyskinesia
- Akathesia
- Extrapyrarnidal symptoms
- **Neuroleptic malignant syndrome**
- Sudden rise or fall in blood pressure
- Blurred vision
- Dry mouth/thickened secretions
- Urinary retention
- Dark urine
- Rash

#### NURSING CONSIDERATIONS:

1. May lower seizure threshold in individuals with seizures/epilepsy.
2. Monitor for sedative effects.

## UNIT 1, SECTION 9: GASTROINTESTINAL SYSTEM DRUGS

### E. CLASSIFICATION: ANTI-ULCER AGENTS

#### INDICATIONS:

1. Used to decrease gastric acid secretions.
2. Also used to treat discomfort from ulcers and GERD.

#### DRUG EXAMPLES:

- famotidine (Pepcid<sup>®</sup>)
- ranitidine hydrochloride (Zantac<sup>®</sup>)
- omeprazole (Prilosec<sup>®</sup>)
- esomeprazole magnesium (Nexium<sup>®</sup>)
- pantoprazole sodium (Protonix<sup>®</sup>)
- sucralfate (Carafate<sup>®</sup>)
- omeprazole/sodium bicarbonate (Zegerid<sup>®</sup>)

#### SIDE EFFECTS/ADVERSE REACTIONS:

*(Items in bold have the potential to be life-threatening)*

- Headaches
- Dizziness
- Confusion (particularly with the elderly)
- Diarrhea
- Constipation
- Nausea
- Taste changes

#### NURSING CONSIDERATIONS:

1. Monitor for blood in stools, emesis, or gastric aspirate.

## UNIT 1, SECTION 9: GASTROINTESTINAL SYSTEM DRUGS

### F. CLASSIFICATION: DIGESTANTS

#### INDICATIONS:

1. Used to replace or supplement one of the enzymes or other chemical substances that aid in digestion of food.

#### DRUG EXAMPLES:

- lactose enzyme (Lactacid<sup>®</sup>)
- pancrelipase (Creon<sup>®</sup>, Pancrease<sup>®</sup>)

#### SIDE EFFECTS/ADVERSE REACTIONS:

*(Items in bold have the potential to be life-threatening)*

- Nausea
- Cramping
- Diarrhea with high doses

#### NURSING CONSIDERATIONS:

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

#### INDICATIONS:

1. Used to combat symptoms of diabetes insipidus and enuresis (bedwetting) in children
2. Acts as a screening agent for primary adrenal insufficiency
3. Used to treat growth impairment due to growth hormone insufficiency

#### DRUG EXAMPLES:

- corticotropin (ACTH<sup>®</sup>, Acthar<sup>®</sup>)
- desmopressin acetate (DDAVP<sup>®</sup>)
- lypressin (Diapid<sup>®</sup>)
- vasopressin (Pitressin<sup>®</sup>)
- somatotropin (Humatrope<sup>®</sup>)
- somatrem (Protropin<sup>®</sup>)

#### SIDE EFFECTS/ADVERSE REACTIONS:

*(Items in bold have the potential to be life-threatening)*

- **Seizures**
- **Decreased cardiac output**
- **Bronchoconstriction**
- Headache
- Drowsiness
- Hypertension
- Nausea/Vomiting
- Depression
- Edema
- Suppression of the immune system
- Hyperglycemia
- Arthralgia
- Myalgia

#### NURSING IMPLICATIONS:

1. Monitor weight, intake and output.
2. Monitor for signs of infection.



## UNIT I, SECTION 10: HORMONES AND SYNTHETIC SUBSTITUTES

### B. CLASSIFICATION: GONADAL HORMONES

#### INDICATIONS:

1. 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.
2. Estrogens are used to treat menopausal symptoms, prostatic cancer, postmenopausal osteoporosis, and various estrogen deficiency states.
3. Progestins are used to relieve dysfunctional uterine bleeding and to treat amenorrhea and endometriosis.
4. Oral contraceptives are used to prevent pregnancy and regulate menses.
5. Raloxifene is used to treat/prevent osteoporosis and decrease risk of invasive breast cancer in postmenopausal women with osteoporosis or at high risk for breast cancer.

#### DRUG EXAMPLES:

- Androgens: danazol (Danocrine<sup>®</sup>)  
fluoxymesterone (Android F<sup>®</sup>)  
testosterone (Andro<sup>®</sup>, Androlaq<sup>®</sup>)
- Estrogens: estrogenic substances, conjugated (Premarin<sup>®</sup>, Cenestin<sup>®</sup>)  
estradiol/estradiol, cyplonate/estradiol, valerate/estradiol  
transdermal system (Estraderm TTS<sup>®</sup>, Climara<sup>®</sup>, Vivelle<sup>®</sup>)
- Progestins: medroxyprogesterone acetate (Provera<sup>®</sup>, Depo-Provera<sup>®</sup>)  
norethindrone acetate (Norlutin<sup>®</sup>, Aygestin<sup>®</sup>)
- Estrogens/Progestins Combinations: Prempro<sup>®</sup>, Premphase<sup>®</sup>, Femhrt<sup>®</sup>
- Oral Contraceptives: Brevicon<sup>®</sup>, Ortho-Novum<sup>®</sup>
- Other: PlanB<sup>®</sup>, Next Choice<sup>®</sup>, Mirena<sup>®</sup>  
etonogestrel and estradiol vaginal ring (NuvaRing<sup>®</sup>)  
raloxifene (Evista<sup>®</sup>) – selective estrogen receptor modulator

#### SIDE EFFECTS/ADVERSE REACTIONS:

*(Items in bold have the potential to be life-threatening)*

- Androgens: edema, thromboembolism, weight gain, deepening of the voice, decreased breast size

- Estrogens: headache, thromboembolism, dysmenorrhea, amenorrhea, breakthrough bleeding, weight gain
- Progestins: depression, thromboembolism, pulmonary embolism, edema, breakthrough bleeding, breast tenderness, gingival bleeding, rashes, pigmentation, allergic reactions
- Contraceptives: headaches, depression, edema, stroke, elevated blood pressure, phlebitis, embolism, intolerance to contact lenses, menstrual irregularities, breast tenderness, weight gain, pigmentation changes, dermatitis

**NURSING CONSIDERATIONS:**

1. Teach to report symptoms such as edema, enlarged breasts, headache, weight gain of more than 5 pounds, and tarry stools.
2. Teach females that complications with oral contraceptives may occur more frequently in women who smoke.
3. **Teach that antibiotics may alter the effectiveness of oral contraceptives; therefore, other methods of birth control should be used.**
4. Teach the importance of getting regular pap smears while on estrogen therapy and what to do in the event of a missed dose.
5. Teach to consult with physician any periods of inactivity (bedrest, etc.) to prevent thromboembolism.

## UNIT I, SECTION 10: HORMONES AND SYNTHETIC SUBSTITUTES

### C. CLASSIFICATION: THYROID HORMONES

#### INDICATIONS:

1. Used to treat hypothyroidism

#### DRUG EXAMPLES:

- levothyroxine sodium T4 (Synthroid<sup>®</sup>, Levothroid<sup>®</sup>)

#### SIDE EFFECTS/ADVERSE REACTIONS:

*(Items in bold have the potential to be life-threatening)*

- Nervousness
- Insomnia
- Tremors
- Tachycardia
- Palpitations
- Arrhythmias

#### NURSING CONSIDERATIONS:

1. Teach to take drug at same time each day to maintain a constant drug level.
2. 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

#### INDICATIONS:

1. Used to treat hyperthyroidism
2. Used prior to thyroidectomy or in thyrotoxic crisis

#### DRUG EXAMPLES:

- methimazole (Tapazole<sup>®</sup>)
- potassium iodide and iodine (Lugol's Solution<sup>®</sup>)
- propylthiouracil PTU (Propyl-Thyracil<sup>®</sup>)

#### SIDE EFFECTS/ADVERSE REACTIONS:

*(Items in bold have the potential to be life-threatening)*

- Jaundice
- Nausea
- Vomiting

#### NURSING CONSIDERATIONS:

1. Take with meals to prevent gastric irritation.
2. Teach to store these drugs in light resistant containers.
3. potassium iodide and iodine (Lugol's Solution<sup>®</sup>):
  - Dilute oral doses in water, milk, or fruit juices and give with meals.
  - Give with a straw to avoid tooth discoloration.
4. Use with Lithium may intensify the Antithyroid effect.
5. Caution about eating foods high in iodine (ex. shellfish, iodized salt).

## UNIT I, SECTION 10: HORMONES AND SYNTHETIC SUBSTITUTES

### E. CLASSIFICATION: ANTIDIABETIC AGENTS: ORAL HYPOGLYCEMIC AGENTS

#### INDICATIONS:

1. 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.

#### DRUG EXAMPLES:

- glipizide (Glucotrol<sup>®</sup>)
- glyburide (DiaBeta<sup>®</sup>)
- metformin hydrochloride (Glucophage<sup>®</sup>)
- pioglitazone hydrochloride (Actos<sup>®</sup>)
- rosiglitazone (Avandia<sup>®</sup>)
- sitagliptin phosphate (Januvia<sup>®</sup>)
- glimepiride (Amaryl<sup>®</sup>)

#### SIDE EFFECTS/ADVERSE REACTIONS:

*(Items in bold have the potential to be life-threatening)*

- Muscle weakness
- Hypoglycemia/hyperglycemia
- Diarrhea
- Nausea
- Vomiting
- Flatulence
- Infection
- Edema

#### NURSING CONSIDERATIONS:

1. Monitor blood sugar levels.
2. Monitor for symptoms of hypo- and hyper-glycemia when changing from one antidiabetic agent to another.
3. 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, cimetadine, salicylates).
4. Metformin (Glucophage<sup>®</sup>) should be discontinued before IV contrast.

## UNIT I, SECTION 10: HORMONES AND SYNTHETIC SUBSTITUTES

### F. CLASSIFICATION: ANTIDIABETIC AGENTS: INSULIN

#### INDICATIONS:

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

#### DRUG EXAMPLES:

##### Rapid Acting:

Lispro (Humalog <sup>®</sup> )	Onset: 5 - 15 minutes
Aspart (Novolog <sup>®</sup> )	Peak: 45 - 75 minutes
Glulisine (Apidra <sup>®</sup> )	Duration: 2 - 4 hours

##### Short Acting:

Regular	Onset: about 30 minutes
Humulin R <sup>®</sup>	Peak: 2 - 4 hours
Humulin R Regular U-500 <sup>®</sup>	Duration: 5 - 8 hours

##### Intermediate Acting:

NPH	Onset: about 2 hours
Humulin N <sup>®</sup>	Peak: 4 - 12 hours
Novolin N <sup>®</sup>	Duration: 18 - 28 hours

##### Intermediate to Long Acting:

Insulin detemir (Levemir <sup>®</sup> )	Onset: about 2 hours
	Peak: 3 - 9 hours
	Duration: 6 - 24 hours

##### Long Acting:

Insulin glargine (Lantus <sup>®</sup> )	Onset: about 2 hours
	Peak: no peak
	Duration: 20 - >24 hours

##### Insulin Mixtures:

Humulin 70/30	Onset: about 2 hours
Humalog 75/25 (NPL neutral protamine Lispro)	Peak: 6 hours
Humalog 50/50 (NPL neutral protamine Lispro)	Duration: 15 hours

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

## **SIDE EFFECTS/ADVERSE REACTIONS:**

*(Items in bold have the potential to be life-threatening)*

- **Hypoglycemia**
- Lipohypertrophy
- Urticaria
- Swelling at the injection site
- **Hyperglycemia**
- Lipodystrophy
- Redness

## **NURSING CONSIDERATIONS:**

1. All unopened insulin shall be stored in a refrigerator, but not in the freezer.
2. Unopened insulin is good refrigerated until the manufacturer's date on the vial.
3. Once opened, insulin may be kept on the medication cart, unrefrigerated up to 28 days (as long as it is not exposed to heat and light). Place date on vial to reflect expiration in 28 days (discard date).
4. **ALWAYS** check the expiration date(both the manufacturer's date and discard date).
5. Roll the vial gently between palms to mix. **DO NOT** shake.
6. Use a calibrated insulin syringe to accurately measure the dose.
7. Rotate the injection sites to prevent atrophy and hypertrophy of the subcutaneous tissue.
8. **DO NOT** massage the injection site as this may inhibit absorption.
9. Give routine insulin at the same time every day.
10. Insulin may be administered via insulin pump. Review the correct use of the pump prior to administration.
11. Have carbohydrates available for emergency use in the event of hypoglycemia.
10. Helpful Hint: When mixing insulin, clear insulin is drawn up first and cloudy last.

## **SPECIAL NOTE:**

**\*Lantus is a clear long acting insulin. Ideal administration time should be 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 1, SECTION 11: VITAMINS, MINERALS, ELECTROLYTES AND OTHER DIETARY SUPPLEMENTS

### A. CLASSIFICATION: VITAMINS

#### INDICATIONS:

1. Used to SUPPLEMENT diets during periods of increased demands such as pregnancy
2. Used to ensure proper growth and development during infancy childhood
3. Used to compensate for decreased intake and absorption during illness.

#### DRUG EXAMPLES:

- Fat Soluble: vitamin A (Aquasol A<sup>®</sup>)  
vitamin D (Drisdol<sup>®</sup>, Cholecalciferol D<sub>3</sub><sup>®</sup>)  
vitamin E  
vitamin K (Phytonadione (K<sub>1</sub>)<sup>®</sup>, Menadione/Menadiol Sodium<sup>®</sup>)  
diphosphate (Vitamin K<sub>3</sub><sup>®</sup>)
- Water Soluble: vitamin B<sub>1</sub> (Thiamine Hydrochloride<sup>®</sup>)  
vitamin B<sub>2</sub> (Riboflavin<sup>®</sup>)  
vitamin B<sub>3</sub> (Niacin<sup>®</sup>, Nicotinic Acid<sup>®</sup>, Niacinamide<sup>®</sup>)  
vitamin B<sub>6</sub> (Pyridoxine Hydrochloride<sup>®</sup>)  
vitamin B<sub>9</sub> (Folic Acid<sup>®</sup>)  
vitamin B<sub>12</sub> (Cyanocobalamin<sup>®</sup>, Hydroxocobalamin B<sub>12a</sub><sup>®</sup>)  
vitamin C (Ascorbic Acid<sup>®</sup>)  
pantothenic acid

#### SIDE EFFECTS/ADVERSE REACTIONS:

*(Items in bold have the potential to be life-threatening)*

- **vitamin A** (seen only with toxicity): hypoplastic anemia, irritability, headache, lethargy, GI irritation, alopecia, drying and scaling of skin, slow growth, decalcification of bones, blurred vision, drowsiness, nausea, vomiting
- **vitamin D** (seen only with toxicity): headache, ataxia, psychosis, calcification of soft tissue, dry mouth, metallic taste, polyuria, albuminuria, 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 B<sub>1</sub>**: restlessness, feeling of warmth, pruritus, nausea, sweating, diarrhea, tightness of the throat, cyanosis, weakness, pulmonary edema



- **vitamin B<sub>2</sub>**: bright yellow urine in high doses
- **vitamin B<sub>3</sub>**: dizziness, transient headache, hyperglycemia, flushing, pruritus, dryness of skin
- **vitamin B<sub>6</sub>**: drowsiness, Paresthesis
- **vitamin B<sub>9</sub>**: allergic skin reactions and **bronchospasms**, general malaise
- **vitamin B<sub>12</sub>**: **peripheral vascular thrombosis**, transient diarrhea, itching, pain from injection
- **vitamin C**: faintness, diarrhea, epigastric pain, acid urine, renal stones

**NURSING CONSIDERATIONS:**

1. Inconsistent amounts of Vitamin K may interfere with anticoagulant therapy.
2. Store vitamins in a cool place in a container resistant to light.
3. **DO NOT** give Mineral Oil and Fat Soluble Vitamins together because the oil will absorb the vitamin.

**UNIT 1, SECTION 11: VITAMINS, MINERALS, ELECTROLYTES AND OTHER DIETARY SUPPLEMENTS**

**B. CLASSIFICATION: MINERALS**

**INDICATIONS:**

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

**DRUG EXAMPLES:**

- Calcium
- Chloride
- Magnesium
- Phosphorous
- Potassium
- Sodium
- Sulfur
- Manganese
- Selenium
- Zinc

**SIDE EFFECTS/ADVERSE REACTIONS:**

*(Items in bold have the potential to be life-threatening)*

- **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 CONSIDERATIONS:**

1. Store minerals in a cool place in a container resistant to light.
2. Calcium should be separated at least 2 hours before and up to 6 hours after administration of antibiotics.

**UNIT 1, SECTION 11: VITAMINS, MINERALS, ELECTROLYTES AND OTHER DIETARY SUPPLEMENTS**

**C. CLASSIFICATION: ELECTROLYTES**

**INDICATIONS:**

1. Electrolytes are used to maintain adequate electrolyte levels in the body necessary for proper function of electrolytes and other bodily functions.

**DRUG EXAMPLES:**

- calcium citrate
- calcium carbonate
- magnesium sulfate
- potassium bicarbonate (K-Lyte<sup>®</sup>)
- potassium chloride (K-Lor<sup>®</sup>)
- ringer's lactate
- sodium chloride

**SIDE EFFECTS/ADVERSE REACTIONS:**

*(Items in bold have the potential to be life-threatening)*

- Tingling sensation
- Headache
- Mental confusion
- Nausea
- Vomiting
- Diarrhea
- Urticaria
- Flushing
- Sweating

**NURSING CONSIDERATIONS:**

1. Teach the importance of taking potassium with at least 4 ounces of water or fluid to prevent esophageal/stomach irritation.
2. Calcium carbonate requires food for optimal absorption.

**UNIT 1, SECTION 11: VITAMINS, MINERALS, ELECTROLYTES AND OTHER DIETARY SUPPLEMENTS**

**D. CLASSIFICATION: PROBIOTICS**

**INDICATIONS:**

1. Used to maintain the balance of good microorganisms in the gut, promote intestinal health, protect good microorganisms in the gut, strengthen the immune defenses, and improve consistency of bowel movements.

**DRUG EXAMPLES:**

- saccharomyces boulardii (Florastor<sup>®</sup>)
- lactobacillus (Lactinex<sup>®</sup>, Bacid<sup>®</sup>)

**SIDE EFFECTS/ADVERSE REACTIONS:**

*(Items in bold have the potential to be life-threatening)*

- Florastor<sup>®</sup> Gas  
Constipation  
Thirst

**NURSING CONSIDERATIONS:**

1. Avoid Lactinex<sup>®</sup> if sensitive to milk products or soy.
2. Separate dosing of Lactinex<sup>®</sup> from antibiotics by at least 2 hours.
3. Lactinex<sup>®</sup> must be refrigerated.
4. Florastor<sup>®</sup> should not be taken if allergic to yeast or if currently taking an antifungal medication.
5. Florastor<sup>®</sup> contains only a small amount of lactose and has been successfully taken by people who can't eat lactose. Florastor<sup>®</sup> makes lactase which aids in the digestion of lactose.

**UNIT 1, SECTION 11: VITAMINS, MINERALS, ELECTROLYTES AND OTHER DIETARY SUPPLEMENTS**

**E. CLASSIFICATION: OTHER DIETARY SUPPLEMENTS**

**INDICATIONS:**

1. These medications reduce risk for heart disease, including high cholesterol and high blood pressure.
2. Fish oil helps reduce symptoms of rheumatoid arthritis.

**DRUG EXAMPLES:**

- Omega 3 fatty acids (Omega rite)
- Fish Oil Supplements
- Flaxseed

**SIDE EFFECTS/ADVERSE REACTIONS:**

*(Items in bold have the potential to be life-threatening)*

- Fish oil can cause gas, bloating, diarrhea and leave fishy aftertaste
- Reduced glycemic control among diabetics

**NURSING CONSIDERATIONS:**

1. Should be used cautiously by people who bruise easily, have a bleeding disorder, or take blood thinning medications as high doses of omega 3 fatty acids may increase risk of bleeding.
2. Store supplements as indicated by manufacturer as some may require refrigeration to maintain its potency.

## UNIT 1, SECTION 12: MISCELLANEOUS THERAPEUTIC AGENTS

### A. CLASSIFICATION: AGENTS AFFECTING BONE LOSS

#### INDICATIONS:

1. Bisphosphonates are a family of drugs used to prevent and treat certain types of bone loss (osteoporosis) especially in postmenopausal women and treatment of Paget's disease and individuals on some anticonvulsants.

#### DRUG EXAMPLES:

- Bisphosphonates: alendronate sodium (Fosamax<sup>®</sup>)  
ibandronate (Boniva<sup>®</sup>)  
rispedronate (Actonel<sup>®</sup>)  
zoledronic acid (Reclast<sup>®</sup>, Zometa<sup>®</sup>)
- Parathyroid Agents: calcitonin (Miacalcin<sup>®</sup>, Salmonine<sup>®</sup>, Fortical<sup>®</sup>)  
teriparatide (Forteo<sup>®</sup>)
- Vitamin D Analog: calcitriol (Calcijex<sup>®</sup>, Rocaltrol<sup>®</sup>)

#### SIDE EFFECTS/ADVERSE REACTIONS:

*(Items in bold have the potential to be life-threatening)*

- Diarrhea
- Bone pain
- Constipation
- Chills
- Myalgia
- Abdominal pain
- Esophageal ulceration
- Nausea
- Arthralgia
- Fever
- Flu-like symptoms
- Chest pain
- Anorexia

#### NURSING CONSIDERATIONS:

1. Must take with full glass (6-8 ounces) of water at least 30 minutes before food, fluids, or other medications. Individual must be in an upright position for at least 30-60 minutes after taking medication.
2. A dental evaluation is recommended prior to starting bisphosphonates to determine the need for possible tooth extractions.
3. Monitor for difficulty swallowing or pain with swallowing.
4. Oral doses should not be held in the mouth, crushed, or chewed.
5. When administered nasally, must alternate nostrils daily.

6. If medication requires subcutaneous administration, give in the thigh or abdominal wall once daily, alternating sites.

**UNIT 1, SECTION 13:      MEDICATIONS USED IN SUBSTANCE ABUSE TREATMENT**

**A.      CLASSIFICATION:      SYNTHETIC OPIOID ANALGESIC: AGONIST**

**INDICATIONS:**

1. Maintenance treatment of opioid dependence
2. Management for severe, chronic pain
3. Narcotic detoxification

**DRUG EXAMPLES:**

- methadone hydrochloride (Dolophine<sup>®</sup>)

**SIDE EFFECTS/ADVERSE REACTIONS:**

*(Items in bold have the potential to be life-threatening)*

- |                                       |  |
|---------------------------------------|--|
| • <b>Hypoventilation</b>              | • Constipation                           |
| • Skin rash/itching                   | • Chronic fatigue                        |
| • Exhaustion                          | • Confusion/memory loss                  |
| • Mood changes                        | • Constricted pupil                      |
| • Blurred vision                      | • Low blood pressure                     |
| • <b>Cardiac arrhythmia</b>           | • Headache                               |
| • Increased sweating/heat intolerance | • Swelling of hands, arms, feet and legs |
| • <b>Respiratory depression</b>       | • Fainting                               |

**NURSING CONSIDERATIONS:**

1. Overdose symptoms may include drowsiness, pinpoint pupils, confusion, cold and clammy skin, weak pulse, shallow breathing/respiratory depression, or fainting. Seek emergency medical attention since an overdose of methadone can be fatal.
2. Tolerance and dependence usually develop with repeated doses and results in diminished effect if opiate drugs are used by individuals maintained on methadone.
3. High doses of methadone alleviate individual's cravings of opioids.
4. In some treatment settings, the Clinical Opiate Withdrawal Scale (COWS) is used to assess the degree of opiate withdrawal the individual is on.



**UNIT 1, SECTION 13:      MEDICATIONS USED IN SUBSTANCE ABUSE TREATMENT**

**B.      CLASSIFICATION:      SEMI-SYNTHETIC OPIOID ANALGESIC: PARTIAL AGONIST**

**INDICATIONS:**

1. Used to treat addiction in higher doses
2. Control moderate acute pain in non-opioid-tolerant individual in lower dosages
3. Used to control moderate chronic pain

**DRUG EXAMPLES:**

- buprenorphine hydrochloride (Subutex<sup>®</sup>, Buprenex<sup>®</sup>)
- buprenorphine + naloxone (Suboxone<sup>®</sup>)

**SIDE EFFECTS/ADVERSE REACTIONS:**

*(Items in bold have the potential to be life-threatening)*

- Nausea/vomiting
- Constipation
- Dizziness
- Memory loss
- Perspiration
- **Respiratory depression**
- Dry mouth
- Drowsiness
- Headache
- Cognitive & neural inhibition
- Orthostatic hypotension

**NURSING CONSIDERATIONS:**

1. Instruct individual in the correct use of medication (directions must be followed exactly). Medication must be used regularly, not occasionally. Take missed doses as soon as remembered; if almost time for next dose, skip missed dose and return to regular dosing schedule. Do not take 2 doses at once unless directed by health care professional. Do not discontinue use without consulting health care professional; abrupt discontinuation may cause withdrawal symptoms.
2. Caution individual that buprenorphine hydrochloride may be a target for people who abuse drugs. Store medications in a safe place to protect them from theft. Selling/giving this medication to others is against the law.
3. Advise individual to immediately notify health care professional promptly if faintness, dizziness, confusion, slowed breathing, skin or whites of eyes turn yellow, urine turns dark, light-colored stools, decreased appetite, nausea or abdominal pain occurs.

4. In some treatment settings, the Clinical Opiate Withdrawal Scale (COWS) is used to assess the degree of opiate withdrawal the individual is on.

**UNIT 1, SECTION 13:      MEDICATIONS USED IN SUBSTANCE ABUSE TREATMENT**

**C.      CLASSIFICATION:      ALCOHOL ABUSE THERAPY ADJUNCT**

**INDICATIONS:**

1. Treatment of chronic alcoholism by producing an acute sensitivity to alcohol.

**DRUG EXAMPLES:**

- disulfiram (Antabuse®)
- acamprosate (Campral®)

**SIDE EFFECTS/ADVERSE REACTIONS:**

*(Items in bold have the potential to be life-threatening)*

- Drowsiness
- **Respiratory depression**
- Diarrhea
- Metallic or garlic taste in mouth
- Neurotoxicity causing extrapyramidal and other symptoms
- Headache
- **Death**
- Flatulence
- Nausea

**NURSING CONSIDERATIONS:**

1. Antabuse® is a strong deterrent to drinking that causes unpleasant physical effects when alcohol is consumed.
2. Aversive sensations are flushing in the face and neck, sweating, nausea and vomiting, headache, heart palpitations and difficulty breathing which could last 1-2 hours on average.
3. Campral® is most effective when used with individuals who have a minimum of 7 to 10 days abstinence.

**UNIT 1, SECTION 13:      MEDICATIONS USED IN SUBSTANCE ABUSE  
TREATMENT**

**D.      CLASSIFICATION:      OPIOID RECEPTOR ANTAGONIST**

**INDICATIONS:**

1. Alcohol and opioid dependence

**DRUG EXAMPLES:**

- naltrexone hydrochloride (Revia<sup>®</sup>, Depade<sup>®</sup>)
- naltrexone (Vivitrol<sup>®</sup>)

**SIDE EFFECTS/ADVERSE REACTIONS:**

*(Items in bold have the potential to be life-threatening)*

- Diarrhea
- Liver damage
- Abdominal cramping

**NURSING CONSIDERATIONS:**

1. Teach individual use of opioids while taking these medications may cause severe withdrawal symptoms.
2. Encourage individual taking naltrexone to keep a card or a note in their wallet in case of an injury or medical emergency to let medical staff know to use special procedures if opiate-based painkillers are to be used.
3. Contraindicated in individuals with acute hepatitis or liver failure.

**UNIT II: NURSING RESPONSIBILITIES IN MEDICATION ADMINISTRATION**

**OBJECTIVE I: Identify precautions to take to prevent medication errors.**

**A. Utilization of the basic rights of medication administration:**

1. Right individual
2. Right medication
3. Right dose
4. Right route
5. Right time
6. Right documentation

**B. 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.  
NOTE: Be aware of look- alike and sound-alike medications (ex. Diazepam and Lorazepam).
- c. **NEVER** administer medications prepared by another person (co-worker).

2. **Documentation:**

- a. chart medications immediately after they are given.
- b. record removal of controlled drugs when the medication is removed from the cart/cabinet and prepared for administration per facility policy/protocol.

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

**A. Solids:**

1. **Tablets** (ex., Aspirin<sup>®</sup>):

- a. powdered medications compressed into small discs.
- b. avoid breaking unless the tablet is scored.
- c. may crush some tablets if the individual has difficulty swallowing.

2. **Enteric coated tablets** (ex., Bisacodyl-Dulcolax<sup>®</sup>, Ferrous Gluconate<sup>®</sup>):
  - a. will **NOT** dissolve or begin action until reaching the small intestines.
  - b. **NEVER** crush or dissolve.
  - c. instruct the individual **NOT** to chew the tablets.
  - d. avoid giving with milk, milk products, or Antacids.
3. **Capsules** (ex., Phenytoin –Dilantin<sup>®</sup>):
  - a. gelatin containers which hold a powder or liquid drug.
  - b. avoid opening unless approved by the Pharmacy.
4. **Powders** (ex., Psyllium Hydrophilic-Metamucil<sup>®</sup>):
  - a. reconstitute with water or other liquids.
  - b. read and follow directions.

**B. Liquids:**

1. **Suspensions** (ex., Milk of Magnesia<sup>®</sup>):
  - a. medications mixed with a liquid but not dissolved.
  - b. shake well before administering.
2. **Elixirs** (ex., Diphenhydramine HCL-Benadryl<sup>®</sup>, Phenobarbital):
  - a. medications dissolved in a solution of alcohol and water which has been sweetened and flavored.
  - b. use should be avoided in known alcoholics; use caution if alcohol abuse is suspected.
3. **Syrups** (ex., Docusate<sup>®</sup>, Amantadine<sup>®</sup>):
  - a. medications dissolved in a thick, sweet liquid with added flavorings.
  - b. use caution when administering to diabetics (sugar-free available).

**OBJECTIVE III: Select the appropriate delivery method to use in medication administration.**

**A. Solids:** (ex., 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 (ex., iron preparations) or interfere with absorption by forming a precipitate (ex., Tetracycline).
  4. **Juices:** some medications should NOT be taken with fruit juices which are acidic and cause premature breakdown of the drug (ex., Penicillin, Erythromycin, certain BP meds).

**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 facility policy prior to administering medications.
5. Flush with 30-50cc of water before and after medication administration (unless ordered otherwise).
6. When a medication is ordered that should be administered on an empty stomach and the individual receives continuous feedings, the Medical Provider/Pharmacy should have specific orders to address stopping the feeding before and after as determined necessary.
7. 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.

8. **DO NOT** use a plunger to force medications through the tube. A gentle nudge is acceptable. Allow medications and fluids to go in by gravity.

**OBJECTIVE IV: Identify individual's rights regarding medications.**

**A. Knowledge of medication:**

1. The 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 individual's family or significant other(s) should be involved.
3. The RN is responsible for assessing and developing the individual's medication teaching plan.
4. All medication education provided **MUST** be documented in the individual's record. Documentation should include a specific description of:
  - a. who was taught (ex., individual, family).
  - b. what was taught (ex., drug name, side effects).
  - c. how it was taught (ex., handouts, demonstration).
  - d. individual's, guardian's, family's response.
  - e. assessment of effectiveness and additional education needed.

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

1. With refusal, the nurse should, if possible:
  - a. assess the reason for the refusal.
  - b. reattempt the procedure later if not contraindicated.
  - c. seek assistance from other team members as appropriate.
  - d. counsel the individual as appropriate.
2. If the 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. Some individuals may have Advanced Directives or a behavioral intervention plan which must be considered.**



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

- A. Assessment of the 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: (ex., hypertensive crisis, anaphylactic shock).
  - 2. Side effects: (ex., dry mouth with Antihypertensive Drugs).
  - 3. Therapeutic effects: (ex., reduction in delusions and hallucinations with Antipsychotics, symptom control).
  - 4. Absence of desired effects: (ex., continued symptoms of infection with antibiotic therapy).
  - 5. Nursing interventions.
  
- D. Documentation:**
  - 1. Observations.
  - 2. Nursing interventions.
  - 3. Individual's response to nursing interventions.
  - 4. Information communicated to the medical provider.

**OBJECTIVE VI: 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 VII: 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 individual in terms he/she understands.
- B. All medications **MUST** be identifiable until time of administration.
- C. **Oral:** See Objective II (forms of oral medications) and Objective III (delivery method) 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. 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. 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 individual to place it underneath the tongue.
    - b. Instruct the individual **NOT** to swallow or chew tablets.

- 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 individual to lie or sit down with head tilted back, if tolerated.
  4. Wear gloves.
  5. Cleanse the eye to remove any exudate.
  6. Expose the lower conjunctival sac.
  7. 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.
  8. Instruct the individual to close his/her eye for 1-2 minutes to allow absorption.
  9. Wait at least 5 minutes between administration of multiple eye drops.
- 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).
  3. Wear gloves.
  4. Instruct the individual to lie on his/her side with the ear to be treated facing upward.
  5. 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 individual is a child, pull the lobe down and forward.)
  6. Taking care **NOT** to touch the ear with the dropper, instill the prescribed drops.
  7. Instruct the individual to remain on his/her side for a few minutes after instillation.
- G. **Nose Preparations (Drops):**
1. Wear gloves.
  2. Position the individual on his/her back with shoulders elevated and head tilted back.

3. Insert the dropper about 1/3 inch in the nares and instill the prescribed drops. **DO NOT** touch the external nares with the dropper.
4. Instruct the 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 individual to lay 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 individual remain on his/her side for at least 20 minutes, if tolerated, to prevent expulsion.
3. To administer vaginal suppositories:
  - a. place the individual in a lithotomy position (on back with knees bent), if tolerated.
  - b. cleanse the perineum with warm, soapy water.
  - c. insert the applicator 2 inches into the vagina; deposit the suppository.
  - d. instruct the 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 individual should be instructed to use diaphragmatic and pursed-lip breathing procedures.
3. Instruct the individual to exhale fully to begin and then inhale slowly and deeply during the procedure, exhaling as fully as possible.

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

**A. 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 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 individual's body size.
  4. **Check for blood backflow (aspirate) prior to injecting unless contraindicated. (DO NOT ASPIRATE WITH INTRADERMAL AND CERTAIN SUBCUTANEOUS 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.**
- 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 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. **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.
- b. **PRECAUTION:** Individuals can have a severe anaphylactic reaction when testing antigens.
- c. **NOTE: Only nurses credentialed in the administration of TSTs may administer and read TSTs.**
- d. **sites:** usual site is the inner surface of the forearm
- e. equipment:
  - (1.) prescribed medication
  - (2.) sterile tuberculin syringe with needle
  - (3.) alcohol swab
  - (4.) TST ruler/caliper
- f. **procedure for Tuberculin Skin Test (TST):**
  - (1.) inject 0.1ml of air into vial
  - (2.) withdraw medication assuring air bubbles are out of syringe
  - (3.) position the forearm and stretch the skin taut
  - (4.) cleanse the site with alcohol swab
  - (5.) insert the needle, with the bevel up, into the superficial layer of the skin. You should be able to see the tip of the needle just under the skin. **DO NOT ASPIRATE.**
  - (6.) slowly inject the medication; expect resistance.
  - (7.) watch for a small, pale wheal to form.
  - (8.) withdraw the needle. **DO NOT MASSAGE THE SITE.**
  - (9.) measure wheal to assure it is 6-10mm in diameter.
  - (10.) document administration (date, time, location, manufacturer, lot #, expiration date) per facility policy.
  - (11.) test is read 48-72 hours after administration.
  - (12.) inspect the skin at the injection point. Palpate over site and mark any induration (palpable raised hardened area).
  - (13.) measure induration at widest point perpendicular to the long axis of the arm. Do not include erythema (area of redness) in reading.
  - (14.) document date/time TST was read. Always document reading in millimeters (mm).
  - (15.) interpret results according to the latest epidemiological guidelines from NC TB Control Program.
- g. **CONTRAINDICATIONS:**
  - o History of positive TST
  - o Previous treatment for TB (latent or active)

- Allergic reaction to the TST
- Extensive eczema or burns (at physician's discretion)
- Current viral illness (other than cold)
- Vaccinated with a live virus in past month
- Currently receiving treatment with anti-tuberculosis drugs
- Pregnancy (per facility policy)

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 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.

c. **equipment:**

- (1.) syringe with 23G - 25G 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. **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.**
- (5.) relax the grip and pull back slightly on the plunger (aspirate) to check needle placement.

- (6.) inject the solution slowly.
  - (7.) wait 10 seconds before withdrawing the needle at the same angle it was inserted and apply pressure with alcohol sponge over the injection point.  
Gently massage the site unless contraindicated.
- 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.) **DO NOT ASPIRATE.**
  - (4.) points of emphasis.
    - (a.) All unopened insulin shall be stored in a refrigerator. Once opened, a vial may be kept on the medication cart, unrefrigerated up to 28 days (as long as it is not exposed to heat and light). **DO NOT ALLOW IT TO FREEZE.**
    - (b.) When opened, date the vial to reflect expiration in 28 days (discard date).
    - (c.) **ALWAYS** check the expiration date (both manufacturer's and discard date) prior to using.
    - (d.) **ALWAYS USE AN INSULIN SYRINGE.**
    - (e.) blood sugar tests are usually performed before the individual eats or is administered Insulin.
    - (f.) follow a site rotation plan. **DO NOT GIVE IN THE SAME POINT OF AN INJECTION SITE MORE FREQUENTLY THAN ONCE A MONTH.**
    - (g.) 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.
    - (h.) Regular and NPH Insulin can be mixed in the same syringe using the following steps:
      - ❖ clean the tops of both vials with an alcohol sponge.
      - ❖ 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.



- ❖ 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**.
- ❖ insert the needle into the NPH Insulin, holding the vial at eye level and extract the desired dose.

**HINT: Clear insulin is drawn up first and cloudy last.**

- f. **guidelines for Heparin/Lovenox injections:**
- (1.) the preferred site 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 within 2 inches of a scar, bruise or the umbilicus.
  - (4.) **DO NOT ASPIRATE.**
  - (5.) **DO NOT MASSAGE.**

3. **Intramuscular injections:**

a. **purpose:**

- (1.) when a more rapid action is desired

b. **sites:**

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

**NOTE:** Assess the muscle mass to determine the capacity for absorption. When administering less than 1.5 cc's, a smaller muscle may be used (ex. deltoid). When administering more than 1.5 cc's, use a larger muscle (ex. upper outer quadrant of the buttocks). When administering more than 3 cc's, ALWAYS divide the dose in half and give in 2 separate sites (Refer to the facility's policy for maximum dose allowed in one site).

**Pediatric Alert:** For children, the vastus lateralis muscle of the thigh is used most often because it's usually the best developed and contains no large nerves or blood vessels, minimizing the risk of serious injury.

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<sup>®</sup>] or Fluphenazine [Prolixin<sup>®</sup>] 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 IX: 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 patient's 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 X: 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. Individual's record.
  - 3. Incident Report, if applicable.
- D. Steps taken to prevent future errors.

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

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

Demonstrated by completion of the each facility's "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 the medication in a dosage form which can be measured accurately from the Pharmacy. If this is not available, the nurse should consult 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 1:**

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.

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

#### Examples of Formula 1:

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 per dose?

Step I: Set up your formula as a fraction.

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

Step II: Use the conversion chart (see end of Unit III). Change the “desired dose” and “on hand dose” to the same system.

$$\begin{array}{l} 0.05 \text{ Gm} = 50 \text{ mg} \\ 25 \text{ mg} = 25 \text{ mg} \end{array}$$

Step III: Do simple math.

$$\frac{50 \text{ mg}}{25 \text{ mg}} \times \frac{1}{1} = 2 \text{ tablets}$$

Step IV: HAVE YOU ANSWERED YOUR ORIGINAL QUESTION? 2 tablets per dose

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

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); therefore, the conversion chart is not needed.

Step III: Do simple math.

$$\frac{20 \text{ mg}}{10 \text{ mg}} \times \frac{1}{1} = \frac{20}{10} = 2 \text{ capsules}$$

Step IV: HAVE YOU ANSWERED YOUR ORIGINAL QUESTION? 2 capsules per dose

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.

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

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

Step III: Do simple math.

$$\frac{0.125 \text{ mg}}{0.25 \text{ mg}} \times \frac{1}{1} = \frac{0.125}{0.250} = 0.5 \text{ ml's}$$

Step IV: HAVE YOU ANSWERED YOUR ORIGINAL QUESTION? 0.5 ml's

### **FORMULA 2:**

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 states the strength that is provided.

#### Example of Formula 2:

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 per dose?

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.

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

$$5X = 10$$

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

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

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

Step IV: HAVE YOU ANSWERED YOUR ORIGINAL QUESTION? 2 tablets per dose

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

### **COMMON EQUIVALENTS**

1 Gm = 1000 mg	5 cc = 1 teaspoon
30 cc = 1 fluid ounce	15 cc = 1 tablespoon = 1/2 fluid ounce
1 L (liter) = 1000 cc	1 ml = 1 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 q6h  
Bottle: Lanoxin Elixir 0.05 mg/cc  
Question: How many cc's will you give q6h?
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?  
Question: 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