MEDICATION ADMINISTRATION

UNIT II

PREFACE

Unit 2 presents medications according to their therapeutic use. In each section related anatomy and physiology are reviewed before the classifications of the medications are discussed. This approach establishes a background through which the therapeutic action of the medications can clearly be understood.

Emphasis is placed on current medication therapy. The discussion of each medication classification will concentrate on the main therapeutic effects, side effects and major cautions and responsibilities when administering selected classifications of medications.

Throughout Unit 2, there are tables with examples of medications, preparations, therapeutic use, side effects, food/medication interactions and pertinent comments. Medications are listed by generic and trade names. The trade names are capitalized. It must be emphasized that not all trade names are given. Trade names are subject to constant additions and deletions as companies begin production or cease producing a given generic medication. Pertinent information on food/medication interactions is also included when appropriate. Interactions are an important part of medication therapy. Many people receive three, four, five or more medications per day. Therefore, it is essential to know how medications and food may interact with each other in order to provide safe care to our consumers.

When reading through the content, pay close attention to the charts and tables, as you will find additional information for each classification. As you examine the medication tables, look for medications that you may be familiar with. The tables have a few examples of the most common medications within each classification. Also, most tables have room for you to add medications that may not be in the table but are used in your place of employment.
UNIT 2

SECTION 1

GENERAL AND LOCAL ANTI-INFECTIVES

OBJECTIVES

At the completion of this section, you should be able to:

1. Define the classification of medications used as anti-infectives
2. Given a specific medication classification, list three (3) side effects.
3. State responsibilities, other than observation for side effects, when administering medications in these classifications.
4. Describe the difference between broad and narrow spectrum antibiotics.
5. List the types of anti-infectives, their uses, and possible side effects.
INTRODUCTION

Bacteria are organisms found virtually everywhere. Bacteria that cause infection are harmful; those that do not may be helpful or harmless. Bacteria are normally found in the mouth, gastrointestinal tract, nose, upper respiratory passages, and on the skin. This presents a problem if the skin is broken, as with a cut, because the bacteria can penetrate into body tissue and set up an area of infection. The bacteria produce poisons (toxins) which cause signs of redness, tissue damage, fever, and other symptoms associated with the infectious process.

Infection may be local and visible, such as infected finger nail. The signs would include redness, swelling and pain around the finger nail. Infection may also be general or systemic, involving more than one area in the body, such as pneumonia. Signs of a general infection may include elevated temperature, cough, “rundown” feeling, poor appetite, and shortness of breath.

The medication classifications which will be discussed in this section are:

- **ANTIBIOTICS**  
  Medications that are used to destroy or control bacteria
- **ANTIFUNGALS**  
  Medications that are used to treat fungus infections
- **AMEBICIDES**  
  Medications that destroy protozoa
- **TRICHOMONACIDES**  
  Medications that destroy trichomonas
- **ANTIPARASITICS**  
  Medications that are used to treat parasites
- **ANTHELMINTICS**  
  Medications that are used to rid the body of worms

CONTENT

When consumers demonstrate any signs or symptoms of an infection, they should be seen by a physician. The physician may order antibiotics, medications that destroy or control bacteria. Antibiotics may also be used prophylactically prior to dental or surgical procedures for consumers with a history of rheumatic fever, heart valve disease, or foreign hardware in the body.
ANTIBIOTIC MEDICATIONS

There are literally thousands of types of bacteria; therefore, it is necessary to have many different antibiotic medications.

It is important to know that some antibiotics are bacterial specific and the bacteria should be identified before an antibiotic is prescribed. The procedure for bacterial identification (culture and sensitivity) involves obtaining a specimen from the infected area (throat, urine, mucus from lungs) and sending the specimen for laboratory analysis. The laboratory technician will determine which bacteria is causing the infection and what antibiotic can best fight it.

Each antibiotic has its own characteristic range (spectrum) of activity against various bacteria. Antibiotics that are effective against a wide range of bacteria are said to have a broad range of activity and are called broad-spectrum antibiotics. Antibiotics that only control a few bacteria are said to have a narrow range of activity and are called narrow-spectrum antibiotics.

Broad spectrum, narrow spectrum, gram positive and gram negative are ways of defining the usefulness of a specific antibiotic.

In an ideal situation, when a person has signs of an infection, the physician orders a specimen sent to the laboratory and waits for the results before ordering a specific antibiotic. However, this often presents a problem because a report may take several days to be done. Therefore, when a person is seriously ill, the physician may immediately start the consumer on a broad spectrum antibiotic. When the lab report comes back, it may be necessary for the doctor to order a different antibiotic or the initial antibiotic may still be the medication of choice.

CAUTIONS AND/OR RESPONSIBILITIES WHEN ADMINISTERING: ANTIBIOTICS

The discovery of antibiotics was a great breakthrough for medicine and the medications were often referred to as “miracle medications.” However, there are some cautions for prescribing
and administering antibiotics.

*Antibiotics should be restricted to use in significant infections only.* They should never be given for minor infections because with frequent or prolonged use the bacteria can become resistant to the antibiotic activity and, in the event of a serious infection, antibiotics may not be as effective.

Major cautions to be aware of with antibiotics are as follows:

**ALLERGIC REACTION**

Allergic reaction is an abnormal response or reaction to a foreign substance. An antibiotic is a foreign substance to the body. An allergic reaction can occur immediately after the person takes the antibiotic or after the person has been on the medication for several days.

The allergic response may range from mild to life-threatening, such as an inability to breathe and low blood pressure that can lead to circulatory collapse and coma. This is called anaphylactic shock and is a life or death emergency. The key word is *shock* and the immediate treatment is according to first aid principles.

**NOTE:** IF AN ALLERGIC REACTION IS SUSPECTED IT MUST BE REPORTED AND RECORDED AND MEDICATION SHOULD NOT BE GIVEN UNTIL DIRECTED BY THE HEALTH CARE PRACTITIONER.

A life-threatening allergic reaction such as an inability to breathe and low blood pressure that can lead to circulatory collapse and death is called ANAPHYLACTIC SHOCK and it requires IMMEDIATE MEDICAL ATTENTION.

**SIGNS** of anaphylactic shock may include:

- Neck and facial swelling
- A weak fast pulse
- Restlessness, agitation
- Low blood pressure
TOXIC REACTIONS

Another important reason why antibiotics are prescribed with caution is toxic reactions. Toxic means poisonous or dangerous, which means certain antibiotics can be very dangerous to some organs in the body. In general, antibiotics produce few toxic effects, but because the toxic effects can be life threatening or leave permanent damage, it is important to be aware that a toxic reaction can occur.

**Toxic Reactions are Rare, but Usually are Serious When They Occur**

Signs of toxic reactions that may be observed are:

- Decreased Urinary Output
- Lack of Energy
- Change in Skin Color
- Hearing Impairment

SUPERINFECTION

Superinfection usually refers to a second infection by a microorganism that is resistant to the medication being used to treat the original infection.

The second microorganism may be a resistant strain of the first infection; a different pathogen; or one of the body’s normal flora when the antibiotic has destroyed competing bacteria.

**SIGNS of a superinfection may include:**

- Rectal/vaginal itching
- Fever
Diarrhea

Sore mouth (thrush)

ADMINISTRATION AND CARE OF ANTIBIOTICS

Before administration of an antibiotic, you must determine if the consumer has ever had an allergic reaction to an antibiotic.

When a doctor orders an antibiotic, he will ask about allergic reactions. You should check the consumer’s medical record to determine if there is any record of a reaction to an antibiotic.

The general care and storage of antibiotics are very important. All antibiotics break down with age, heat and moisture. Their effectiveness can change if improper storage occurs. Always read the label for storage directions such as:

“Refrigerate” or “Store in a Dry, Cool Area”

Antibiotics always have an expiration date.

Check the Expiration Date and Never Use After That Date

In general, when a person begins to take antibiotics, he/she feels better and symptoms begin to subside in 3-4 days. However, this does not mean the person is cured. The entire prescription should be given unless the doctor orders it to be stopped.

Your responsibilities when administering antibiotics include:

- Observe for toxic reaction, allergic reactions and superinfections.
- Check medical record for a history of allergic reactions.
- Read label for storage directions and expiration date.
- Give antibiotics on time.
- Use entire prescription unless orders are changed

PENICILLINS – These medications are broad spectrum antibiotics. Examples include: Penicillin VK, Ampicillin, Veetids.
**ERYTHROMYCINS** – These medications work against many of the same bacteria as penicillin. Therefore, erythromycins are good substitutes to use for people with penicillin allergies. Allergic reactions to erythromycins are rare, and side effects are limited to nausea and vomiting. Examples of trade name preparations of erythromycins are **Ilosone, Erythrocin, E-mycin and E.E.S.**

**TETRACYCLINES** – This is a group of broad spectrum antibiotics. Tetracyclines are suitable alternatives to penicillins for many infections and are very effective for lower respiratory infections, such as bronchitis. They should never be given to children in the tooth development stages as they stain and darken teeth permanently. **TETRACYCLINE can cause serious side effects if used after the expiration date.** Examples include: **Vibromycin, Achromycin, Doxycycline.**

**CEPHALOSPORINS** – This group of antibiotics are similar to the penicillins. They are broad-spectrum medications used mainly as substitutes for penicillins in cases of allergy or resistance and in the treatment of certain infections. The cephalosporins should be given at least one hour before or two hours after eating. Cephalosporins decrease the effectiveness of birth control pills; women must use another form of birth control while taking these medications. Examples include: **Ceftin, Velosef, Vantin, Keflex.**

**MISCELLANEOUS ANTI-INFECTIVES**

Antibiotics are not useful for all types of infections. There are some miscellaneous anti-infective agents developed to treat other specific infections.

**ANTIFUNGAL**

Antifungal agents are used to treat fungal infections of the hair, skin, nails, mouth, and vagina. These medications produce a selected spectrum of activity and only affect certain fungi. Examples include: **Nystatin, Fulvicin, Nizoral, Sporanox.**
AMEBICIDES AND TRICHOMONACIDES

Amoeba and micro-organisms are responsible for producing dysentery in humans. This infection gains access to the body through contaminated food and water. Dysentery is generally found in areas with low standards of hygiene. However, it may also be found in areas where there is overcrowding. Signs of dysentery will vary from mild to severe diarrhea, poor appetite, dehydration and fatigue.

TRICHOMONAS is a disease that is frequently transmitted through sexual intercourse. The signs and symptoms are more evident in the female and are a vaginal itch, burning and discharge. In the male, the only sign is a penile discharge.

Treatment is the same for both sexes. Oral tablets may be ordered and/or suppositories to be inserted in the genital areas. Flagyl is often the treatment of choice.

CAUTIONS AND/OR RESPONSIBILITIES WHEN ADMINISTERING: AMEBICIDES AND TRICOMONACIDES

Amebicides act to destroy amoeba type infections. Side effects may include:

Nausea  Vomiting  Diarrhea

Trichomonacides act to destroy trichomonal infections. Side effects may include:

Nausea  Headache  Diarrhea  Vaginal and Urethral Burning

ANTIPARASITIC DRUGS

Parasitic skin infections can be quite common in any environment. This is especially true in areas where many people live closely together. Parasitic skin infections include the following: Scabies, Body Lice (Pediculosis Corporis), Head Lice (Pediculosis Capitus), and Pubic Lice.
SCABIES

Scabies produces tiny red spots between the fingers, in the arm pits, on the genitalia, and abdomen. Severe itching accompanies the red spots. The skin above the neckline is rarely affected because the parasite grows in warm, moist areas.

LICE/PEDICULOSIS

Head lice are usually demonstrated by the presence of small, white dots called nits (eggs) in the hair. Pediculosis of the body and pubis is accompanied by itching. Signs of infestation may be: Consumer Scratching, Sore Skin From Scratching, and Presence of Eggs (Nits). The nits may look like dandruff that is difficult to remove.

CAUTIONS AND/OR RESPONSIBILITIES WHEN APPLYING: ANTIPARASITIC DRUGS

Kwell (Gamma Benzene Hexachloride, generic name is lindane) is a topical medication used for the treatment of both scabies and lice. Topical means that the medication is used only on the outside of the skin. Kwell should not be used on open skin areas because it can further irritate the skin. Kwell (Gamma Benzene Hexachloride) is available as:

- Lotion
- Cream
- Shampoo

NOTE: Review for potential side effects before administering.

FOR HEAD LICE

If a major skin irritation rash develops, discontinue treatment and report it to the nurse. If by accident the Kwell comes in contact with the consumer’s eyes, wash eyes with water and report to the physician.

Nix Cream Rinse is a newer product that is less toxic than Kwell.

CAUTIONS – If one consumer has an infection, all consumers and staff in close contact should be examined. All clothing and bedding should be machine washed or dry cleaned.
Your agency should have a procedure for infestation. Check with the infection control nurse or designee.

**ANTHELMINTICS**

Parasitic worm infections are a major cause of disease throughout the world. However, in the United States the most frequently encountered parasitic infections are limited to pinworm, roundworm and tapeworm. These parasites gain access to the gastrointestinal tract when food or soil has been contaminated with worm eggs and is ingested (especially by individuals with Pica). Symptoms of infection may be: **Diarrhea, Nausea, Loss of Appetite and Abdominal Cramps, Rectal Itching.**

If the consumer is heavily infected, you may see worms in the stools. Anthelmintics are medications which destroy worm infections.

**CAUTIONS AND/OR RESPONSIBILITIES WHEN ADMINISTERING ANTHELMINTICS**

When a consumer is taking anthelmintics, the following side effects may occur:

- Nausea
- Headache
- Fever
- Diarrhea

Usually laxatives are also administered to increase intestinal activity and facilitate bowel movements so that worms and eggs are excreted into the stools. Examples: **Vermox**
UNIT 2

SECTION 2

MEDICATIONS THAT AFFECT THE RESPIRATORY SYSTEM

OBJECTIVES

At the completion of the Section, you should be able to:

1. Define the classification of medications that affect the respiratory system.
2. Given a specific medication classification, state at least two (2) side effects.
3. State responsibilities, other than observation for side effects when administering medications in these classifications.
4. Discuss allergic response in terms of its development and symptoms.
5. Define anaphylactic shock and list four (4) symptoms.
6. State the emergency medications used in anaphylactic shock.
The medication classifications which will be discussed in this Section are:

**ANTIHISTAMINES**
Medications that reduce the effects of histamine, relieving allergy symptoms. They may also be used to prevent motion sickness.

**EXPECTORANTS**
Medications that break up mucus and facilitate the expulsion from the lungs

**ANTITUSSIVES**
Medications that suppress the cough reflex

**COUGH PREPARATIONS**
Medications that increase the size of the bronchial tubes

**ANTITUBERCULARS**
Medications that are used to treat tuberculosis

**RELATED INFORMATION**

The respiratory system extends from the nose to the lungs. Organs of respiration include the nose, throat, trachea, bronchi, and lungs. The nose is the normal route of air flow for breathing. When there is an obstruction to nasal breathing, people breathe through the mouth.

The air is warmed, moistened, and filtered as it passes through the nose to the throat, (a common passageway for air and food). The air continues to the lungs where oxygen and carbon dioxide are exchanged.

The base of the lungs is on top of the diaphragm muscle. When the diaphragm and intercostal muscles contract, the thoracic cavity enlarges, pulling the lungs downward and out; air rushes in (inspiration). When these muscles relax, the thorax becomes smaller, making the space within the lungs smaller and forcing the air out (expiration). Inspiration plus expiration equals respiration. Exercise such as running makes the body cells work faster and put out more waste products, such as carbon dioxide. Therefore, the faster you run, the faster you must breathe.
IMMUNITY AND ALLERGIC RESPONSE

The subject of allergies is closely related to the respiratory system and requires some understanding prior to study of the medication classifications. An allergic response may occur when a person comes in contact with a substance not normally present in the body, such as bacteria, pollen and medications. These substances are called antigens. Development of immunity depends on the body’s ability to identify antigens, then produce antibodies to protect itself. You may develop immunity in different ways:

1. Natural Immunity – you are born with the immunity.
2. Acquired Immunity – you become immune after having a disease or being given a vaccine. Examples of acquired immunity are Tetanus and Measles, Mumps and Rubella.

Now you have seen how the body protects itself. The allergic response is an over-sensitivity of the body to an antigen which is actually harmless, e.g., plant pollens. In an allergic reaction, the body “overestimates” the danger and produces uncomfortable symptoms.

CONTENT

When a person who has a tendency to become allergic first comes in contact with a specific antigen, antibodies are formed. When he comes in contact with this antigen again, an antigen-antibody reaction occurs. This results in the release of histamine. It is the histamine that causes the typical symptoms of an allergic response.

Red, Watery Eyes

Sneezing

Runny Nose

Rash-Hives

With the exception of a skin rash and hives, these symptoms are the same as those of a common cold. However, another more extreme reaction called anaphylactic shock may occur. This is a life threatening, rapidly occurring allergic reaction.
In anaphylactic shock, the person will become short of breath due to swelling in the throat and will become apprehensive. If at this point there is no treatment, the allergic response becomes stronger and the symptoms will progress to:

- **Neck and Facial Swelling**
- **Restlessness and Agitation**
- **Weak, Fast Pulse**
- **Low Blood Pressure**

These symptoms require emergency treatment. The most common medication used is Epinephrine (Adrenalin), a very strong bronchodilator which is given by injection.

Medications are the most frequent causes of anaphylactic shock. However, you may also have heard of people dying after being stung by a bee. This is a good example of anaphylactic shock. What has happened is that the person is highly allergic to the bee venom. People have also been known to develop serious reactions following ingestion of foods and/or medications such as antibiotics or iodine.

Since people with a history of allergies are more likely to develop anaphylactic shock, it is imperative that any person with a past history of allergies be watched closely when receiving new medication.

First aid for anaphylactic shock is administration of emergency medication via auto-injectors.

**NOTE:** If an Epipen auto-injector is prescribed you will need to receive individual instruction for administration, transportation, and storage by a health care professional.

**ANTIHISTAMINES**

The antihistamine medications act as **ANTAGONISTS** to prevent or reduce the symptoms of an allergy. They exert their greatest beneficial effect in nasal allergies. The antihistamines do not prevent or effectively relieve asthma.
Problems usually relieved by antihistamines are:

- Hives
- Common Colds
- Nasal Allergies
- Medication Reactions
- Insect Bites

Some antihistamines are effective in preventing or relieving motion sickness. Many antihistamines are available in oral, topical or inhalant preparations.

**CAUTIONS AND/OR RESPONSIBILITIES WHEN ADMINISTERING ANTIHISTAMINES**

Antihistamines potentiate (strengthen) the actions of Central Nervous System depressants. Therefore, when a consumer is taking an antihistamine, Central Nervous System depressants should be avoided. Some common CNS depressants to avoid are alcohol, sedatives, and tranquilizers. Examples of Antihistamines include chlorpheniramine, Phenergan, Benadryl.

The most common side effects are:

- **Drowsiness**
- **Dry Mouth**
- **Dry Eyes**

Sucking hard candy or chewing gum will help prevent mouth dryness. Sucking is the action that produces the saliva that offsets mouth dryness.

**DECONGESTANTS**

Decongestants relieve nasal congestion and are commonly used in the treatment of upper respiratory tract infections, especially in those susceptible to middle ear infections or sinus infections.

Infection or irritation in the nasal lining causes the blood vessels to dilate (swell). Fluid then passes into the lining which, in turn, swells and produces more mucus.
Decongestants stimulate constriction (narrowing) of the blood vessels in the nasal lining which reduces swelling, inflammation, mucus production, and nasal congestion. They are available in tablets, capsules, liquids, and nose drops.

**EXAMPLE:** Sudafed, Dimetapp, Dristan Nasal Spray, Contac

**CAUTIONS AND RESPONSIBILITIES WHEN ADMINISTERING DECONGESTANTS**

1. Oral doses may cause a very rapid heart rate. Therefore, decongestants are not generally used for people with heart problems, or high blood pressure.

2. Decongestant nose drops should be used for as short a period of time as possible. There may be a “rebound” reaction (i.e., congestion worse than that for which the medication was used) when stopping after several days of use.

**POSSIBLE SIDE EFFECTS**

- Palpitations
- Restlessness
- Elevated blood pressure
- Anxiety

**EXPECTORANTS AND ANTITUSSIVES (Cough Preparations)**

Expectorants are medications that affect the mucous membrane lining of the respiratory tract and facilitate the expulsion of the mucus (sputum). Many expectorants can be obtained without prescription. These medications are referred to as “Over The Counter” (OTC) medications.

Antitussives are preparations that depress the cough reflex. Some antitussives contain codeine derivatives to depress the cough reflex. Preparations that contain codeine require a physician’s order. Expectorants and antitussives are sometimes combined and referred to as cough preparations.
CAUTIONS AND/OR RESPONSIBILITIES WHEN ADMINISTERING EXpectorANTS AND ANTITUSSIVES

Many of these cough preparations contain sugar and alcohol. Alcohol could produce a medication interaction and the sugar content may be a problem if the consumer is a diabetic.

In general, side effects that may occur are:

Drowsiness   Nausea   Vomiting

Also, it is best to advise the consumer not to drink or eat anything for at least a half hour after taking these preparations and to administer cough preparations after other medication which may be ordered at the same time. Examples: Robitussin, Phenergan

BRONCODILATORS

Asthma is a long-term, chronic inflammatory disorder that blocks airflow in and out of the lungs. Asthma causes tiny airways in the lungs to over-react to specific factors – called triggers – and to become inflamed and obstructed, making it difficult to breathe comfortably. Airways also get smaller due to a tightening of the muscles in the ways of airways, and/or “stuffed up” due to large amounts of mucus. Symptoms of asthma include shortness of breath, tightness in the chest, wheezing, and coughing. Asthma cannot be cured; however, it can be controlled by the use of medications, including bronchodilators which open the airways of the lungs and make breathing easier.

CAUTIONS AND/OR RESPONSIBILITIES WHEN ADMINISTERING: BRONCHODILATORS

Some side effects that may occur when taking bronchodilators are:

Nervousness   Insomnia
Headache   Dry Mouth
Nausea   Tachycardia
Vomiting   Arrhythmias
Sweating   Anxiety
Restlessness
Examples include: Albuterol, Proventil, Brethine

ANTITUBERCULAR

The last classification of medications to be discussed in relation to the respiratory system is the antitubercular medications that are used to treat tuberculosis.

Tuberculosis (TB) is a chronic infection most commonly associated with the lungs. The incidence remains higher in places where people are close together, homeless, elderly, diabetics, alcoholics, people with poor immune systems, immigrant populations. Incidence is also higher in individuals with HIV infection.

CAUTIONS AND/OR RESPONSIBILITIES WHEN ADMINISTERING ANTITUBERCULARS:

Side effects which may occur are:

- Nausea
- Fever
- Vomiting
- Rash
- Jaundice
- Joint Pain
- Anorexia
- Discolored Urine

These medications should be given after meals which help reduce the nausea and vomiting that may occur. Examples include: Isoniazid (INH), Ethambutol (ETH), Rifabutin, Rifampin, Pyrazinamide (PZA). These medications can cause liver damage.
UNIT 2

SECTION 3

MEDICATIONS THAT AFFECT THE CARDIOVASCULAR SYSTEM

OBJECTIVES

At the completion of this section, you should be able to:

1. Define the classification of medications that affect the cardiovascular system.

2. Given a specific medication classification, list at least three (3) side effects.

3. State responsibilities, other than observations for side effects, when administering in these classifications.

4. List three (3) signs that may indicate lack of potassium.

5. Describe the relationship between salt and hypertension.
The medication classifications which will be discussed in this section are:

**DIGITALIS PREPARATIONS**  Medications which slow and strengthen the heartbeat

**ANTIARRHYTHMIC**s  Medications used to correct disorders of the heart rate and rhythm

**VASOCONSTRICTORS**  Medications used to constrict the size of blood vessels

**VASODILATORS**  Medications used to relax the size of blood vessels

**DIURETICS**  Medications used to decrease fluid in the body

**ANTIHYPERTENSIVES**  Medications used to lower blood pressure

**ANTICOAGULANTS**  Medications which decrease clot formation

**COAGULANTS**  Medications which increase clot formation

**RELATED INFORMATION**

The cardiovascular system may be thought of as a transportation system. It takes nourishment and oxygen to the cells and carries away waste products. The system is kept in motion by the force of the heartbeat. Disease which attacks any part of this system interferes with the overall function.

**STRUCTURE AND FUNCTION**

The system is made up of the heart (central pumping station), blood vessels, and the blood itself. It is a continuous network. The heart is a muscular organ. It is hollow inside and divided into four chambers (cavities): the right atrium, the left atrium, the right ventricle, and the left ventricle. It is separated into right and left sides by a wall (septum). Nerve impulses make the heart beat regularly according to body needs. When you run, the heart cells need more oxygen and the heart beats faster.
CARDIAC CYCLE

The heart pumps blood through the body by a series of movements known as the cardiac cycle. The upper chambers of the heart (atria) relax and fill with blood as the lower chamber (ventricles) contract, forcing the blood out of the heart through the aorta and pulmonary arteries. The lower chambers then relax, allowing the blood to flow into them from the upper chambers.

The cardiac cycle is what determines the pulse rate. Each time the heart beats, a pulsation may be felt in an artery. This pulsation is referred to as the pulse. Normal pulse rate will vary with the size, age, activity, and sex of the person. Average rate for adults is 70-90 beats per minute.

MAJOR VESSELS

Arteries are vessels which carry blood away from the heart and eventually join the veins. Veins are lined with one way valves which help transport blood back to the heart. Thus, the major vessels are a continuous network through which the blood completes a round trip from the heart to the rest of the body and back to the heart. Blood pressure is the measurement of how hard the heart has to work to pump blood into the arteries and the amount of resistance in the blood vessels. The blood pressure is also affected by rest, activity, weight, stress, and illness. Pulse, respiration, temperature, and blood pressure may also be called the vital signs.

When medications are given for cardiovascular disorder, it may be required that the individual’s pulse and/or blood pressure is taken before the medication is given. The reason is that most of these medications in some way will affect the pulse and/or blood pressure.

BLOOD

If the blood vessels are the network of highways carrying nutrients and wastes, the blood may be thought of as the trucks and cars traveling along the highway. A person generally has 4 to 6 liters (quarts) of blood depending on size, sex, age, and general health. Both the quality and quantity of blood are indicative of health. There are two types of blood cells. They are Red Blood Cells (RBC) which carry oxygen to cells and carbon dioxide away from the cells, and White Blood Cells (WBC) which protect the body from infection by destroying germs.

Disease conditions of any part of the circulatory system will have an effect on the total system. In general, there are two main conditions for which the (heart) medications are used: heart failure and irregular heartbeat.
Heart “failure” means that the heart has failed as a pump. When a person is in good health, the heart accomplishes circulation without faltering. Thus, it does not allow an abnormal amount of blood to accumulate in the veins, in the heart chambers, or in the lungs. The rate of flow is sufficient to provide normality throughout. A failing heart may have such a handicap that it is unable to move blood satisfactorily. Medications may be ordered which will change the rate, rhythm and strength of the heartbeat.

**MEDICATIONS**

Presently the first-line medications to treat congestive heart failure (CHF) are diuretics and Angiotensin-converting enzyme inhibitors (Ace inhibitors). Ace inhibitors have been proven to decrease morbidity and mortality.

Side effects of ACE inhibitors may include: Hypotension, Cough, Rash, Altered Sense of Taste  
Examples: accupril, captoril, Vasotec, Zestril  

Other medications used in the treatment of heart failure are obtained mainly from the digitalis family. The most common is **digoxin**. The primary action of this medication is to slow and strengthen the heartbeat.

**CAUTIONS AND/OR RESPONSIBILITIES WHEN ADMINISTERING DIGITALIS PREPARATIONS**

It must be emphasized that digitalis preparations are **extremely strong**. As with all medications, be absolutely sure you administer the correct **medication** and **dose**. These preparations sound alike and have similar spelling. In order to avoid **errors**, check the label and look closely at the **spelling** and at the **dose prescribed**.

As you remember, the action of digitalis is to slow and strengthen the heartbeat. Therefore, a major responsibility when giving a digitalis medication is to count the pulse **prior** to administering each dose. In adults, if the pulse is **60 or below**, the medication should be held and the physician or nurse notified immediately for further directions.

The side effects of digitalis preparations may include: **Loss of Appetite, Visual Disturbances, Diarrhea, Nausea or Vomiting, Headache, Slow Pulse.**
ANTIARRHYTHMIC

Antiarrhythmic medications are used to correct disorders of the heart rate and rhythm. These medications will either change the rate or the rhythm of contractions.

CAUTIONS AND/OR RESPONSIBILITIES WHEN ADMINISTERING ANTIARRHYTHMIC DRUGS

There are two major cautions to observe when administering antiarrhythmic medications. These medications tend to lower blood pressure so responsibilities include taking the pulse and, if possible, monitoring the blood pressure. If pulse is below 60 and/or blood pressure is low, hold medication and notify the doctor or nurse. Examples include: quinidine, Inderal, Pronestyl, Sotalol, Amiodarone, Mexiletine.

Some possible side effects are:

Ringing in the ears, Confusion, Occasional Mental Depression, Headache, Nausea/Vomiting

DRUGS THAT AFFECT THE BLOOD VESSELS

Abnormal conditions affecting the arteries and veins are many in number and variety. Medications may be used to increase or decrease the size of the blood vessels and thus affect the flow of blood through them. These medications fall into two general classifications: vasoconstrictors and vasodilators.
**VASOCONSTRICTORS**

Vasoconstrictors bring about a decrease in the size of the blood vessels, decreasing blood flow to the body’s vital organs. They may be use to:

- **Stop Hemorrhage, Raise Blood Pressure, Relieve Nasal Congestion, Increase the Force of Heart Action.**

Vasoconstrictors are also referred to as emergency medications and can be used to treat anaphylactic shock and respiratory problems.

**VASODILATORS**

Vasodilators increase the size of the blood vessels which, in turn, increases circulation. Hardening of the arteries (arteriosclerosis) is a fairly common problem. Arteriosclerosis results in a decreased blood flow. This decrease in blood flow may cause severe chest pain (angina) and poor circulation to the extremities.

Vasodilators may be used routinely to: **Decrease Blood Pressure, Prevent Chest Pain and Increase Circulation.**

However, you may also see them used during an attack of chest pain to reduce the severity of the pain. Nitroglycerin is the most common medication used for chest pain and is administered **sublingually.** (Tablet is held under the tongue and allowed to dissolve). Nitroglycerin works fast, within 1-3 minutes. If a consumer is using nitroglycerin, they should keep it with them or readily accessible. Consumers should be given specific directions and guidance by the registered nurse or doctor if they carry the medicine with them.
Nitroglycerin is now manufactured so it is more stable and is good until the expiration date on the bottle. The consumer or the direct care giver should be responsible for proper storage of these medications. In addition, consumers should be instructed to report when they take the medication as this will help us to know:

**How often the pain occurs? How much medication is taken? If medication relieves the pain? When does the consumer get relief?**

Alcohol should be avoided when a person is taking vasodilators because alcohol can also act as a vasodilator and can potentiate (add to) the medication’s action.

Nitroglycerin is also available as an ointment (Nitro-Bid) and as a transdermal patch. The ointment comes with a dose measuring applicator. The applicator serves the dual purpose of measuring the amount of ointment and preventing absorption of the ointment through the fingers while it is being applied. The ointment can be applied to any convenient skin area, but most people use the chest area. If you need to administer this medication, the registered nurse will give you specific directions.

Calcium-Channel Blockers are a class of drugs used to treat hypertension, angina pectoris and certain arrhythmias. They prevent the calcium ions needed for muscle contraction from entering the cells of smooth and cardiac muscle. This causes blood vessel walls to relax and blood to flow more freely to the heart, lowering blood pressure and relieving angina pain. Some calcium-channel blockers, such as nifedipine, slow the electrical impulses that run through heart muscle, thus regulating arrhythmias.

Most calcium-channel blockers, as well as most other drugs, should not be taken with grapefruit juice.

**SIDE EFFECTS THAT MAY OCCUR WITH VASODILATORS INCLUDE:**

- Headache
- Dizziness
- Low Blood Pressure
- Weakness
- Nausea/Vomiting
- Skin Rash
HIGH BLOOD PRESSURE (Hypertension)

Hypertension, a condition in which the blood pressure is abnormally high, is one of the leading causes of strokes, heart attacks, and kidney disease. An estimated 24 million Americans have hypertension disease. In the majority of hypertension cases (approximately 90 percent), the cause of hypertension is unknown. The goal of medication therapy is to lower the blood pressure without causing excessive side effects.

Before discussing medications used to treat hypertension, some information about salt and diet is important.

Salt is a mineral necessary for good health. However, people tend to overuse salt. Salt can contribute to hypertension as it holds water in the body. The increased water content may increase blood pressure.

In addition to salt, being overweight is a factor contributing to hypertension. People who are overweight should be encouraged to lose weight.

There are two classifications of medications used to treat hypertension: diuretics and antihypertensives.

DIURETICS

Diuretics are medications which increase the amount of urine and salt excreted, thus reducing body fluid and lowering blood pressure.

CAUTIONS AND/OR RESPONSIBILITIES WHEN ADMINISTERING DIURETICS

In addition to loss of body salt, some diuretic can cause loss of potassium. Potassium is a mineral which is very important both to skeletal and heart muscle function.
Signs of potassium depletion are: **Muscle Weakness, Fatigue, Confusion, Irregular Heartbeat, Leg Cramps.**

To avoid potassium depletion, the consumer should be encouraged to eat foods high in potassium. Orange juice and bananas are both good potassium supplements and should be eaten daily. Sometimes dietary supplement is not sufficient and the doctor may order a potassium medication, such as **K-Dur** or **Slow-K**. However, always check with the physician for the need to supplement potassium because on certain diuretics cause potassium depletion, and you could endanger the consumer by supplementing too much potassium.

Since diuretics cause increased urination, when possible, they should be administered in the morning so the consumer will not be bothered with frequent urination during the night. In addition, you will know that a diuretic is working by the increased voiding and by monitoring the person’s weight.

In summary, responsibilities include:

- **Observe the signs of low potassium**
- **Encourage foods high in potassium (if indicated)**
- **Monitor blood pressure**
- **Give medication in the morning**

Examples include: **Lasix, Demadex, hydrochlorothiazide**

**ANTIHYPERTENSIVES**

Antihypertensives are medications that are used to treat high blood pressure (hypertension).

Beta-blockers are used to treat many medical conditions. They are primarily used to treat high blood pressure (hypertension), but are also useful for reducing the risk of second heart attack, chest pain (angina), irregular heartbeat (arrhythmias), and migraine headaches.
Most recently, Beta-blockers have been prescribed in combination with other medications for the treatment of congestive heart failure.

Together with aspirin, beta-blockers are the only drug shown in repeated clinical trials to reduce death from heart attack both when taken for primary prevention, at the time of a heart attack, and for secondary prevention.

Beta-blockers can interact with other conditions, diseases, and medicines. For example, some beta-blockers can increase blood lipids (fats) and blood sugar levels in diabetic patients, as well as, make asthma worse. Other effects of the beta-blockers include fatigue, dizziness, headache, weakness, nausea, vomiting, diarrhea and decreased libido. Any symptom that is troublesome and persists should be reported to the physician.

Examples: Beta-blockers are considered selective or non-selective. The selective group only affects the beta1 receptors; examples of Tenormin (atenolol) and Lopressor (metoprolol). The non-selective group can affect both the beta1 and beta 2 receptors; examples are Cartrol (cartelolol) and Coreg (carvedilol). Physicians prescribe the appropriate type of beta-blocker based on the specific treatments needed.

**CAUTIONS AND/OR RESPONSIBILITIES WHEN ADMINISTERING ANTIHYPERTENSIVE DRUGS**

The major caution to observe with these medications is to monitor the blood pressure. Notify nurse or health care provider if blood pressure is significantly low or high.

The possible side effects which may occur with antihypertensive medications are:

**Fatigue, Nasal Congestion, Dizziness, Loss of Appetite, Orthostatic Hypotension (Blood pressure goes down when consumer stands up)**

In general, nasal congestion and dryness of the mouth are most common when a consumer begins taking these medications. Instructing the consumer in good oral hygiene will help relieve mouth dryness.
Examples include: Zestril, Corgard

ANTICOAGULANTS AND COAGULANTS

This group of medications is related to blood clotting. Blood clot formation is a process which is essential to life. Without this process, a person with a simple cut would hemorrhage and survival would be threatened. However, sometimes this mechanism of clot formation is faulty and creates physical problems. Anticoagulants are medications which decrease clot formation. Coagulants increase clot formation.

CAUTIONS AND/OR RESPONSIBILITIES WHEN ADMINISTERING ANTICOAGULANTS

The major caution to observe with anticoagulation therapy is the possibility of hemorrhage. The signs and symptoms related to hemorrhage are:

- Nosebleeds
- Blood in the Stools
- Bleeding Gums
- Black and Blue Marks
- Blood in the Urine
- Change in Vital Signs

If any of these signs are observed, the doctor should be notified. The doctor will probably discontinue the anticoagulants and give the consumer the coagulant vitamin K, which is an antidote for bleeding. The trade names for vitamin K are: Synkavite, Aquamethyton, and Mephyton.

Anticoagulant medications have many interactions with other medications. These other medications either increase or reduce the anticoagulant’s action. Therefore, whenever a consumer on anticoagulation therapy starts or stops another medication, the physician should be provided with that information and a prothrombin time should be done. This is a blood test which measures the time it takes for the blood to clot. When consumers are on anticoagulants, this test is usually done routinely as ordered by the physician. The physician will adjust the dosage to obtain the best results. The most common anticoagulant is Coumadin. If Coumadin is used for long term therapy, medical alert bracelets are available.
**ANTILIPEMICS**

These various cholesterol-lowering agents lower total and “bad”/ or LDL cholesterol by binding with cholesterol in the GI tract and getting rid of it through the bowel or by decreasing the amount of cholesterol produced by the liver.

**Examples:** cholestyramine and colestipol bind with cholesterol in the GI tract.

**Side Effects:** bloating, constipation, nausea.

**Examples:** Zocor, Vescol, Mevacor, lovastatin, pravastatin, and Lipitor decreases the amount of cholesterol produced by the liver by blocking a specific liver enzyme.

**Side Effects:** These have lower incidence of side effects than the other drugs. These can occasionally cause liver abnormalities. Blood tests to monitor liver are done regularly for consumers on these meds.

[Information taken from Women, Take Heart, Richard H. Helfout, M.D.]
UNIT 2

SECTION 4

MEDICATIONS THAT AFFECT THE URINARY SYSTEM

OBJECTIVES

At the completion of this Section, you should be able to:

1. Define the classifications of medications that affect the urinary system.

2. Given the specific medication classification, list at least two (2) effects.

3. State responsibilities, other than observation for side effects, when administering medications in this classification.
The medication classification which will be discussed in this Section are:

- **Sulfonamides**  Anti-infective medications used in the treatment of urinary tract infections.
- **Urinary Antiseptics**  Medications used to treat urinary tract infections.
- **Cholinergics**  Medications that affect the bladder through their action on the nervous system.

**RELATED INFORMATION**

The urinary system is also referred to as the excretory system. As the name applies, the organs of this system produce urine (liquid waste) which is excreted from the body. The urinary system also helps to control the vital water and salt balance of the body. The organs of this system include: the kidneys, ureters, urinary bladder, and urethra.

**STRUCTURE AND FUNCTION**

**THE KIDNEYS.** The two bean-shaped kidneys are located behind the ribs and are held in place by capsules of fat. The outer portion of the kidney is where urine is produced. The blood circulates through the kidneys to be filtered. Water and waste products are removed. The average urine output is 1 to 2 quarts per 24 hours.

**THE URETERS.** The two ureters extend from the kidneys to the urinary bladder and act as a passageway for the urine.

**THE URINARY BLADDER.** The urinary bladder, found within the pelvic cavity, is a reservoir for the urine. It is expelled from the body. The muscular walls of the bladder are able to contract and force urine out. The urge to urinate (micturate or void) occurs when there are 6 to 10 ounces of urine in the bladder. The bladder is capable of holding much more than this amount.

**THE URETHRA.** During urination the urine passes out of the body by way of the urethra. The urethra in the female is about 1 ½ inches long and in the male about 8 inches long. Because the female urethra is shorter there are more frequent infections in females than in men.
SULFONAMIDES

The sulfonamides were the first medications developed to combat infection. Antibiotics eventually replaced sulfonamides for general infections. However, sulfonamides remain the medications of choice for urinary tract infections.

CAUTIONS AND/OR RESPONSIBILITIES WHEN ADMINISTERING SULFONAMIDES

1. Increase fluid intake up to two quarts per day and avoid foods high in calcium such as cheese and milk to avoid stone formation.

2. Report Fever.

Side effects to watch for are:

Nausea, Blood in Urine, Skin Rash, Vomiting, Diarrhea

Examples: Bactrim, Septra, Gantrisin

URINARY ANTISEPTICS

These medications are also used to treat urinary tract infections. Many people who have had a urinary tract infection have recurrences following a period without symptoms. For this reason, they are often placed on long-term medication therapy. Most of the sulfonamides, as well as systemic antibiotics such as the erythromycins, may be used to treat these conditions.

CAUTIONS AND/OR RESPONSIBILITIES WHEN ADMINISTERING URINARY ANTISEPTICS

Some urinary antiseptics will change the color of the urine because of dyes that may have been added. Inform the consumer that this may occur. Also, many of these medications may cause stomach upset. Therefore, they should be administered with meals or food whenever possible. Some medications work best when the urine is strongly acid or basic; or depending on the medication, it may be necessary to either encourage or discourage fluids and foods high in acid.
Your responsibilities include:

**Inform Consumer of Color Change In Urine**

**Encourage Fluid Intake – 1-2 qts./day**

**Find Out If Acid or Base Medium Is Desired**

Urinary tract infections may be painful. Pyridium is a pain medication usually given as a separate drug for 3 days and may be combined with various urinary antiseptics or used alone. The prefix AZO means that pyridium has been added, i.e., AZO Mandelamine.

Examples: Norxin, Furadantin, Macradantin

**CHOLINERGIC MEDICATIONS**

Cholinergic medications have an indirect effect on the urinary bladder. They stimulate the nervous system which, in turn, stimulates the bladder to empty. Certain illnesses, and sometimes advancing age, cause the bladder function to become sluggish.

**Urecholine** is an oral medication used to relieve urinary retention.

Side effects include: Cramping, Diarrhea, Headache

**CHOLINERGIC BLOCKING DRUGS**

Cholinergic blocking medications have the opposite effect (decrease voiding) of cholinergic medications. A condition called “irritable bladder” occurs with some illnesses and also may be associated with aging. Irritable bladder is caused by the nervous system stimulating urination even when the bladder is almost empty.

Examples: Ditropan, Cystospaz, Urispas

Possible side effects: Dry Mouth, Blurred Vision, Urine Retention
At the completion of this Section, you should be able to:

1. Define the classification of medications that affect the nervous system.

2. Given a specific medication classification, list at least three (3) side effects.

3. State responsibilities, other than observation for side effects, when administering medication in these classifications.

4. List three (3) measures other than medications that can be used to calm a consumer.

5. Define epilepsy.

6. Describe observations to make when a seizure occurs.

7. Define Extrapyramidal Syndrome, the causes and treatment.

8. List two (2) medications used to treat extrapyramidal symptoms.

9. Define Tardive Dyskinesia, the causes and treatment.
The medication classifications which will be discussed in this Section are:

CENTRAL NERVOUS SYSTEM STIMULANTS  Medications which *increase* central nervous system functions

**Sub Classifications:**

- **Amphetamine & Caffeine**  Increase mental and physical activity
- **Cholinergic Blocking Medications**  Block or stop symptoms associated with Parkinson’s Disease and side effects of antipsychotic

CENTRAL NERVOUS SYSTEM  Medications which *decrease* central nervous system function

**Sub Classifications:**

- **Sedative-Hypnotic Medications**  Induce sleep and calm the body
- **Analgesic Medications**  Relieve pain
- **Narcotic Medications**  Relieve moderate to severe pain
- **Non-narcotic Medications**  Relieve mild-moderate paid
- **Anti-inflammatory Medications**  Relieve pain due to inflammation
- **Antipyretic Medications**  Reduce body temperature
- **Neuroleptic/Psychotropic/Major Tranquilizers** - Used to treat a variety of psychiatric disorders
- **Antianxiety Medications**  Used to treat mild to moderate states of anxiety
- **Antipsychotic Medications**  Used to treat aggressive and agitated behavior
- **Antidepressant Medications**  Used to relieve depression and anxiety
- **Anticonvulsant Medications**  Used to control seizures and/or behavior
RELATED INFORMATION

The nervous system controls and coordinates all voluntary and involuntary body activities, even the production of hormones. Sensory receptors of the nervous system, such as the eye and ear, enable us to be aware of our surroundings. Special parts of the nervous system are concerned with maintaining normal day-to-day functions while other parts act during emergency situations and other control voluntary activities.

NERVES. Many small cells are bunched together to form nerves. Sensory nerves carry sensations to the brain and spinal cord. Feeling is lost when those nerve impulses are interrupted. Motor nerves carry impulses that cause body activity. Paralysis (loss of function) occurs when these nerves are damaged.

For easier understanding, the nervous system can be divided into several major parts. Remember, though, that the nervous system is one interwoven system, and if one part of it is affected, all of it is affected.

THE CENTRAL NERVOUS SYSTEM. The term Central Nervous System (CNS) refers to the brain and spinal cord.

BRAIN. All mental activities, such as thinking, voluntary movements, interpreting sensations, and emotions are carried out by brain cells. In general, the right side of the brain controls the left side of the body and vice versa.

THE SPINAL CORD. The spinal cord is a continuation of the brain and is about 17 inches long, ending just above the small of the back. Nerves extend from the brain and spinal cord throughout the body.

AUTONOMIC NERVOUS SYSTEM (A.N.S.) The Autonomic Nervous System is concerned with involuntary body activities. It is made up of two parts called the sympathetic and parasympathetic systems. The center of control is the brain stem. Nerve fibers which carry impulses to control the usual functions of heartbeat, digestion, elimination, respiration, and glandular activity are called parasympathetic.

In times of stress or danger, the heart beats faster, the lungs work harder and certain glands increase their production. Blood pressure is increased as the body prepares for action. These activities are brought about by stimulation of the sympathetic system.

SENSORY RECEPTORS. These are the nerve endings found in the skin, joints, nose, mouth, ears and eyes. All of these structures help relay information to the brain.
MEDICATIONS THAT AFFECT THE CENTRAL NERVOUS SYSTEM (CNS)

In general, the medications that act on the CNS may be divided into two groups: those that stimulate and those that depress its functions.

CENTRAL NERVOUS SYSTEM STIMULANTS

Medications which stimulate the CNS speed up all body functions; they:

- Increase Sharpness of Sensation and Perception
- Increase Body Activity
- Increase Alertness and Concentration
- Suppress Fatigue and Inhibit Sleep

CNS stimulants are used for a variety of physical and mental problems. For example, many people start their day with a cup of coffee or tea. Both of these liquids contain caffeine which is a mild CNS stimulant. During the course of the day when one becomes tired, one will have a cup of coffee or tea which “perks” one up. On the other hand, some people who have coffee late at night can’t get to sleep.

In addition to caffeine being present in coffee, tea, chocolate and cola sodas, it is available as a medication. Examples include Vixarin, Tirend, Dexitac, NoDoz. The side effects to be aware of include:

- Inability to Sleep (Insomnia)
- Restlessness – Nervousness
- Increased Heart Rate
- More Frequent Urination
- Dizziness

Caffeine should be avoided by people who have stomach ulcers because it is irritating to the lining of the stomach.
AMPHETAMINES

The amphetamines are CNS stimulants. When used as stimulants, they have the disadvantage of producing tolerance and medication dependency. Therefore, when used, the dosage must continuously be increased in order to achieve the same effect. However, when used for narcolepsy and Attention Deficit and Hyperactivity Disorder (ADHD), tolerance rarely occurs.

Amphetamines stimulate the CNS to increase:

**Mental and Motor Activity**

Amphetamines are occasionally used in the treatment of depression, however, more often used to treat ADHD and treatment of symptoms of Narcolepsy. Treating ADHD with amphetamines may be confusing to you as you might wonder why a stimulant would be given to someone who is already overactive. This is called a “paradoxical effect” meaning that the effect is the opposite of what is normally expected.

**CAUTIONS AND/OR RESPONSIBILITIES WHEN ADMINISTERING AMPHETAMINES**

These medications have many side effects in addition to being habit-forming. They are medications which, when stopped, can cause severe depression.

Common side effects are:

**Loss of Appetite, Dry Mouth, Fast Heartbeat, High Blood Pressure, Restlessness, Inability to Sleep**

Amphetamines used to be used for weight loss, but can no longer be prescribed, dispensed, or administered for weight loss in New York State. For this reason, amphetamines should be given after meals to reduce the appetite suppressant effects. In addition, persons on amphetamines should not drink beverages containing caffeine, such as cola sodas (e.g. Pepsi or Coke), coffee or tea. People on amphetamines should have their blood pressure taken on a regular basis. Any increase should be reported to the nurse. Amphetamines such as Ritalin are controlled drugs and must be kept double-locked.

Examples: **Ritalin, Cylert, Dexedrine**
CENTRAL NERVOUS SYSTEM DEPRESSANTS

CNS Depressants have the opposite effects of the stimulants. They decrease the central nervous system’s activity:

- Decrease Sharpness of Sensation & Perception of Stimuli
- Lessen or Slow Body Activity
- Decrease Alertness & Concentration
- Promote Drowsiness & Sleep

There are various sub-classifications of CNS depressants. However, regardless of the sub-classifications, it is important to remember that they work by depressing activity.

SEDATIVE-HYPNOTIC MEDICATIONS

Though these terms are often used interchangeably, there is a difference in them. A hypnotic is a medication used to produce sleep, whereas a sedative quiets and relaxes a person without producing sleep. However, due to the fact that a person who is relaxed is likely to go to sleep, hypnotics and sedatives will be described together. Sedatives are frequently used to pre-medicate persons for medical appointments.

There are two major classes of sedative hypnotic medications known as barbiturates and non-barbiturates. The non-barbiturates were developed in an effort to produce a sedative hypnotic which did not have adverse effects (e.g., addiction) associated with the barbiturates. So far this goal has not been achieved. In general, both the non-barbiturates and barbiturates produced the same activity.

Examples: Ambien, Restoril, Halcion, Chloral Hydrate

CAUTIONS AND/OR RESPONSIBILITIES WHEN ADMINISTERING SEDATIVES AND HYPNOTICS

Common side effects associated with the sedative-hypnotic medications are:

Drowsiness, Dry Mouth, Lethargy, Poor Balance, Slurred Speech, Nausea, Confusion, Diarrhea
These side effects can be collectively referred to as “hangover symptoms.” Elderly consumers are particularly sensitive to side effects, especially loss of memory.

A major caution with these medications is the possibility of addiction. Prolonged use of sedative-hypnotics may result in increased tolerance and physical dependence. Once this develops the medication must be tapered to withdraw slowly to decrease the onset of withdrawal symptoms.

When possible it is best for consumers to sleep without sedation. At times you may be able to calm and help a consumer relax without medications. Some measures include: providing a quiet environment, glass of warm milk, and reassurance.

There are many medication interactions associated with sedative-hypnotic agents. They potentiate the actions of other depressant medications, leading to greater CNS depression, low blood pressure and muscle relaxation. Some medication classifications which interact with sedatives and hypnotics are:

**Antihypertensives, Antihistamines, Tranquilizers, Alcohol**

Alcohol is a depressant and should never be used with sedative-hypnotics, as the combination of the two may lead to serious depression of the CNS.

Sedative-hypnotics can reduce the effectiveness of:

**Anticoagulants and Oral Contraceptives**

Because of these numerous medication interactions, as with all medications, it is important to let the physician know what medications the consumer is taking.

**NOTE:** A life threatening side effect would be respiratory depression. Therefore, these drugs should be used cautiously in people with breathing problems, such as asthma or emphysema.
ANALGESICS (CNS Depressants)

Pain primarily functions as a protective signal. Pain may warn the individual of imminent danger (fire) or the presence of internal disease (appendicitis, tumors). Relief from pain is desired when the intensity or duration of pain interferes with a person’s ability to function in the activities of daily living. Analgesics are medications which relieve pain.

There are two major sub-classes of analgesics:

Narcotic   (Strong Analgesics)
Non-Narcotic  (Mild Analgesics)

NARCOTIC ANALGESICS

Narcotic analgesics are capable of altering or relieving severe pain and are primarily used to relieve pain of trauma, such as a broken leg, a heart attack, terminal illness, and pain associated with surgery.

Narcotics are controlled substances and are placed in Schedule II of the Controlled Substance Act.

Examples:  Morphine, Demerol, Percodan

CAUTIONS AND/OR RESPONSIBILITIES WHEN ADMINISTERING NARCOTICS

Narcotics are derived from opium or from a synthetic preparation. Morphine sulfate is the strongest narcotic and is an opium preparation. Demerol is synthetic (manmade) and is almost as strong as morphine. Narcotics have some common side effects:

Slow Respiration, Constipation, Sweating (Diaphoresis), Nausea, Vomiting, Tolerance

Before these medications are given, vital signs should be checked. The respiratory rate should be checked for 1 full minute. If respiration are below 12 breaths per minute, the medication should not be given. If the blood pressure is less than 9 mm systolic (the upper number) the medication should not be given.
NON-NARCOTIC ANALGESICS (mild analgesics).  These drugs tend to have many uses in the body:

Mild analgesics relieve mild to moderate pain without altering consciousness or mental function. In particular these medications relieve pain associated with inflammation (arthritis and gout) and dull aches (headaches and muscle aches).

Antipyretics are medications which reduce fever.

Anti-inflammatory medications are medications which reduce pain associated with inflammation.

Examples of non-narcotic analgesics include: Acetaminophen (Tylenol) and aspirin. Non-steroidal anti-inflammatory drugs (NSAIDs) are drugs that can function as analgesics, antipyretics and anti-inflammatoryatories.

Examples: Ibuprofen (Motrin, Advil), Naprosyn

CAUTIONS AND/OR RESPONSIBILITIES WHEN ADMINISTERING MILD ANALGESICS AND ANTIPYRETICS

In low doses these medications relieve pain, aches and fever. However, in order to relieve severe pain associated with arthritis and gout, the medications are administered in larger doses for longer periods of time. Large dose therapy is more frequently associated with causing side effects.

The most common side effects are:

Ringing in the Ears (Tinnitus), Dizziness, Nausea, Cramping, Headache, Diarrhea, Blood Dyscrasia, Drowsiness

There is always the possibility of an allergic response. If you observe signs of this, you must notify the doctor or nurse as soon as possible.

Acetaminophen may produce falsely low blood glucose readings on home monitoring systems. If a person with diabetes is on acetaminophen and has a low blood glucose level, call the RN on call prior to giving any juice or other sweetened drink.
Medications with aspirin are irritating to the stomach lining and should be administered with milk or after meals which helps decrease stomach irritation. These medications are also available with an enteric coating.

**NEUROLEPTICS**

Neuroleptics are antipsychotic agents effective in dosages below hypnotic levels. They frequently exert an effect upon the autonomic and the extrapyramidal nervous systems. New agents block specific dopamine receptors and act on serotonin as well. This group includes the phenothiazines and their subclasses, thioxanthenes, butyrophenones, dihydroindolines, and dibenzoxazepines.

**CAUTIONS AND/OR RESPONSIBILITIES WHEN ADMINISTERING NEUROLEPTIC MEDICATIONS**

1. Alcohol is to be avoided as neuroleptics potentiate the effects of alcohol.
2. Monitor the person for signs of extrapyramidal side effects.
3. Monitor the person for LOW blood pressure.
4. Discuss with the person ways to minimize dry mouth and constipation.
5. Remind the person to avoid activities requiring alertness.
6. Remind the person not to take antacids within one hour of taking these medications.
7. To maintain stabilization, continued therapy is often required.
8. A person receiving antipsychotic meds should be protected from prolonged exposure to sunlight.
PSYCHOTROPICS

A term used to cover a broad range of medications. These medications are commonly referred to as tranquilizers but the two terms should not be used interchangeably. Psychotropics do not cure psychiatric disorders, but they do help relieve anxiety, aggressive behavior, and depression. Once these symptoms are relieved, a person is more receptive to other forms of treatment. The overall class of drugs is “Psychotropic” – Anti-anxiety medications, Anti-Psychotic, Anti-Depressants are types of psychotropic medications.

ANTI-ANXIETY MEDICATIONS

Anxiety, tension, and nervousness are symptoms caused by situations which are interpreted as being threatening or dangerous. These psychological (mental) conflicts can cause physiological (body) changes, such as trembling, sweating, nausea, and increased heart rate. Most people, at some time in their lives, have experienced these uncomfortable feelings. When the cause of the conflict is removed, the body returns to a more relaxed state (autonomic nervous system controls this state). However, if for some reason the source of the anxiety continues, the individual may develop a neurosis which is defined as an “accumulation of anxiety tension.” Neurosis falls under the term “mental illness,” which is a broad title covering a number of psychiatric disturbances involving changes in personality and behavior. Psychosis, defined as a ‘loss of contact with reality,” is also a form of mental illness. In general, psychosis or psychotic state is more severe than a neurosis or a neurotic state.

Anti-anxiety medications are used to treat mild to moderate states of emotional upset. These agents are widely used – sometimes for extended periods of time.

CAUTIONS AND/OR RESPONSIBILITIES WHEN ADMINISTERING ANTI-ANXIETY MEDICATIONS

The actions of anti-anxiety medications resemble those of barbiturates but cause less drowsiness and confusion. Some of these medications are also used for their anticonvulsant properties and will be discussed later in this section.
Almost all of these medications can cause mental and physical dependence and are controlled substances (the one exception is Buspar which has shown no potential for abuse and is not classified as a controlled substance). Because of this dependence, whenever these medications are discontinued it should be done on a gradual basis in order to prevent withdrawal symptoms.

Side effects which may occur will resemble those of many CNS depressants: drowsiness, dizziness and constipation. In addition to these symptoms, others which may occur include:

**Allergic Reactions, Nausea/Vomiting, Ataxia, Low Blood Pressure, Slurred Speech, Drowsiness**

Nausea and/or vomiting can be reduced if these medications are given with or after meals.

Examples: **Valium, Buspar, Xanax, Vistaril**

**ANTIPSYCHOTIC MEDICATIONS**

Antipsychotic medications are used for the treatment of aggressive and agitated behavior and psychosis. These medications are stronger than the minor tranquilizers so, in addition to some of the common side effects of CNS depressants and mild tranquilizers, there are more severe side effects which may occur.

**CAUTIONS AND/OR RESPONSIBILITIES WHEN ADMINISTERING ANTIPSYCHOTIC MEDICATIONS**

Major tranquilizers are effective across a wide range of dosages. The dosage is usually increased gradually over a period of seven to fourteen days or until symptoms are controlled or side effects occur. Due to the physical and mental dependence on these medications, they should not be stopped abruptly because withdrawal symptoms may occur.

Tardive Dyskinesia is another serious side effect of antipsychotic medication. The most visible sign is round the mouth and jaws. The tongue has a snake like movement, jutting in and out. There will be grimacing, lip smacking, and rapid eye blinking.
A blood dyscrasia is either abnormal cell formation or absence of adequate production. The initial signs of a blood dyscrasia resemble those of a common cold: *a tired, aching feeling, sore throat, fever, and swollen glands in the neck.*

If these signs appear and are due to a blood dyscrasia, the person needs immediate medical attention. Fortunately, most people who are on long-term antipsychotic medications also have blood tests done on a regular basis. This helps to monitor any early liver and blood problems which may be occurring.

It has also been noted that consumers taking the antipsychotics can develop a photosensitivity to sunlight. As much as possible, these people should avoid excessive exposure to sunlight and use a good sunscreen.

Another rare but serious side effect is Neuroleptic Malignant Syndrome which may cause severe muscle stiffness, fever, severe tiredness or weakness, fast heartbeat, difficult breathing, increased sweating, loss of bladder control and seizures.

Examples: **Thorazine, Mellaril, Haldol, Serentil, Risperdol, Zyprexa, Seroquel**

**ANTIDEPRESSANTS**

Depression may be caused by external factors such as death of a loved one, divorce, illness, change of environment; or by internal factors, whose causes are difficult to determine. It should be noted that a number of medical disorders and medications can cause or worsen depression.

Depression is characterized by a feeling of sadness. During depression, there are noticeable changes in mood and behavior, along with feelings of frustration and hopelessness. This can be accompanied by changes in sleep, appetite, and sex drive and the appearance of non-specific physical complaints.

Depressed people appear unable to cope with demands or stresses of living. They may withdraw from participation in all activities both at home and in work or school; or, they may exhibit psychomotor agitation, during which they move about constantly, complaining and voicing fears of impending disaster.
**SIGNS OF DEPRESSION** include:

- Decreased appetite
- Anxiety
- Constipation
- Decreased energy level
- Aggression
- Agitation
- Social withdrawal
- Weight gain
- Sleep disorders
- Change in performance level

Depression requires treatment only when its symptoms are severe and prolonged or, it is caused by no discernable environmental problems.

The use of antidepressant medications is used in the treatment of major depressive disorders characterized by genetic predisposition, signs of physiological impairment as listed above, and for recurrent depressive episodes.

Some are used in the treatment of bed wetting and the management of chronic pain symptoms.

Medications used in the treatment of depression are referred to as antidepressants or mood elevators. They relieve depression and also relieve anxiety. The two main types of antidepressants are the heterocyclic antidepressants and the less frequently use monoamine oxidase inhibitors.

**CAUTIONS AND/OR RESPONSIBILITIES WHEN ADMINISTERING ANTIDEPRESSANTS**

Antidepressants usually take several weeks to have a beneficial effect. These medications may lower the threshold for seizures.

Examples: **Parnate, Nardil, Luvox, Elavil, Zoloft, Prozac, Effexor**
HETEROCYCLIC ANTIDEPRESSANTS

The most common group of antidepressants used is the Heterocyclic Antidepressants which relieve symptoms such as lethargy, insomnia, a feeling of despair, and hopelessness. A newer group of heterocyclic, called Serotonin Selective Reuptake Inhibitors (SSRI), work to reduce dysregulation of the Neurotransmitter Serotonin.

EXAMPLES: Desyrel, Elavil, SSRIS: Prozac, Luvox, Zoloft

CAUTIONS AND RESPONSIBILITIES WHEN ADMINISTERING HETEROCYCLIC ANTIDEPRESSANTS:

1. Antidepressant medications usually take several weeks to have a beneficial effect. This is longer than most medications and people must be cautioned not to stop taking it suddenly.

2. People with cardiac disorders may develop arrhythmias, congestive heart disease, and strokes when taking antidepressants.

3. Antidepressants may lower the threshold for seizures in people with epilepsy, especially with Wellbutrin and Ludiomil.

4. Antidepressants may enhance or potentiate CNS depressants including alcohol.

5. People may experience impaired mental and physical abilities.

POSSIBLE SIDE EFFECTS

Blurred vision, Dry Mouth, Constipation, Hallucinations, Jaundice, Extrapyramidal symptoms (EPS), Low/high blood pressure, Drowsiness, Skin rashes, Photosensitivity, Ataxia, Delusions, Nightmares, Palpitations/rapid pulse, Insomnia, Urinary retention
MONOAMINE OXIDASE INHIBITORS (MAOI ANTIDEPRESSANTS)

MAO is the enzyme primarily responsible for inactivating norepinephrine. This is the neurohormone that helps maintain constant blood pressure by stimulating certain blood vessels to constrict when the blood pressure falls below normal.

The inhibition of MAO therefore, may lead to an increase in norepinephrine in the brain, heart and other muscles which then increases the nerve impulses that lead to psychomotor activity.

MAO Inhibitors cause serious side effects including medication-induced strokes and liver damage. They also interact with many foods and medications.

They potentiate medications for the common cold or hay fever which contain vasoconstrictors. They delay the detoxification of central nervous system stimulants including caffeine and central nervous system depressants such as alcohol. They can precipitate a hypertensive crisis with many medications.

MAOIs must be discontinued for a period of several days to weeks before other medications may be ordered.

Small amounts of pressor amines in certain foods can raise the blood pressure to a dangerous level. Such food include: wine, some cheeses, broad beans, beer, canned fish, chicken livers, caffeine, yogurt and yeast.

INTERACTIONS: Hypertensive crisis may occur with tyramine-containing foods, amphetamines, methyldopa, levodopa, dopamine, epinephrine, norepinephrine, antidepressants, guanethidine, reserpine, vasoconstrictors, and nasal decongestants. Hypertension, hypotension, coma or convulsions may occur with narcotic analgesics. They should be discontinued several weeks before surgery. Because of the severity of interactions and side effects, MAOIs are generally NOT the first antidepressant ordered. They will usually be used in treatment of “atypical” depression, those not responding to the heterocyclic antidepressants, or panic attacks.

EXAMPLES: Parnate and Nardil
CAUTIONS AND RESPONSIBILITIES WHEN ADMINISTERING MONAMINE OXIDASE INHIBITORS

1. Encourage the person to avoid alcohol.

2. Encourage the person to carry a card describing the medication s/he is taking.

3. Be aware of ALL contraindicated foods.

LITHIUM

Another antipsychotic that you may come in contact with is lithium which is used to treat people who have been diagnosed as having a particular disturbance known as manic-depressive behaviors. Lithium is highly individualized and there will be specific directions to follow when administering this medication. Individuals on Lithium should carry a medic-alert card or wear a medic alert bracelet or necklace at all times. Also, consumers who take lithium need to have routine blood tests, which helps the physician monitor the dosage of lithium. Examples: Lithobid, Eskalith, Lithonate

EPILEPSY & ANTICONVULSANT MEDICATION

Epilepsy means a tendency to have recurrent seizures. The seizures are not always accompanied by convulsions, but they do involve temporary interruption of consciousness. The seizures reflect a sudden unruly pattern of brain waves which is manifested in several ways. An epileptic may always have the same type of seizure or he/she may experience a variety of types. An aura was once considered a warning that a seizure would occur. However, now many neurologists consider it the first part of the seizure. The aura is important as its symptoms can help localize where in the brain the seizure is starting. The aura is an ill-defined sensation experienced through one of the following senses:

Sight Changes - seeing spots in front of one’s eyes or a blinding light
Taste - especially a bitter taste in the mouth
Hearing - hearing a strange noise
Smelling - smelling a distinctive odor
Anticonvulsant medications are used for the control of chronic seizures, involuntary muscle spasms or movements characteristic of certain neurological diseases. They are most frequently used in the treatment of epilepsy. Anticonvulsant medications cannot cure epilepsy, but taken on a regular basis, they can reduce the number of seizures a person has.

There are many types of epilepsy. Some medications are designed to control all types, while others are more individualized. Anticonvulsant therapy begins with a small dose of medication which is then increased until either the seizures disappear or the person begins to have side effects. If one medication decreases the frequency of seizures, but does not completely prevent them, a second medication may be added. For example, Tegretol, a barbiturate, is sometimes given with Dilantin (anticonvulsant).

CAUTIONS AND RESPONSIBILITIES WHEN ADMINISTERING ANTICONVULSANTS

1. Remind the person to avoid alcohol.

2. Remind the person to use caution while performing activities requiring alertness.

3. Administer these medications, such as Dilantin, with food to decrease gastrointestinal irritation. (Neurontin may be taken with or without food, on full or empty stomach. Capsule may be opened and medicine mixed with applesauce/juice.)

4. Emphasize the importance of good oral hygiene and regular dental examinations.

5. Anticonvulsants interact with a variety of medications. Make sure the health care practitioner is aware of the use of anticonvulsants.

6. The health care practitioner MUST be informed at the first sight of a rash.
POSSIBLE SIDE EFFECTS

There is a wide range of possible side effects associated with the use of anticonvulsant medications. Your instructor will provide you with a list of specific side effects that may occur with the anticonvulsant medications used in your agency. Some of the general side effects to be aware of are: rashes, dizziness, anorexia, slurred speech, hair growth, nausea/vomiting, hair loss, gum overgrowth, constipation, poor coordination, drowsiness, clumsiness or unsteadiness, diarrhea, abdominal cramps.

Dilantin may cause increased hair growth most visible on the upper lip and about the face in the female consumer. This is not a harmful side effect and there is little that can be done to prevent it. Dilantin can also cause gum hypertrophy (overgrowth). However, good oral hygiene will help prevent gum overgrowth and subsequent dental problems.

If a consumer develops gastric distress, it can be minimized by giving large amounts of fluid or giving the medication after a meal.

CARE OF CONSUMER DURING A SEIZURE

When a consumer has a seizure, the biggest danger faced is injury if the consumer falls. It is your responsibility to protect the consumer from injuring him or herself. Loosen any constrictive clothing such as a tie or belt. Do not try to constrict the movements of the consumer during the seizure as it may result in injuring the consumer or yourself. Do not try to put anything such as a spoon or tongue blade into the mouth of the consumer. He cannot swallow his tongue. If he/she should develop breathing difficulty, attempt to put him/her on his/her side so the tongue blocking the airway is moved forward. **Above all, never leave a consumer alone during a seizure.**
OBSERVATIONS TO REPORT AND RECORD

- If there was a loss of consciousness

- The way the consumer fell (direction), time and length of seizure

- The parts of the body involved, movement of eyes

- Skin color, respiration rate, incontinence, if any

- Type of muscle response (tonic or clonic), any injury that occurred

- How the consumer was after the seizure

Examples of anticonvulsants: Dilantin, Depakene, Neurontin, Lamictal, Tegretol

ANTIPARKINSONIAN MEDICATIONS

Parkinson’s Disease is a disorder of the central nervous system. It is a slow, progressive disease in which there is destruction of nerve cells in the brain due to a lack of dopamine in the brain cells. The symptoms of Parkinson’s Disease are very similar to the extrapyramidal symptoms (EPS). These symptoms include tremors, muscle rigidity, mask-like appearance on the face, slowed speech and a shuffling walk.

Possible side effects of these drugs include:

- Urinary retention or difficulty voiding

- Dry mouth

- Nausea

These drugs can be given with meals to reduce nausea.

Common antiparkinsonian medications are: Sinemet, Cogentin, L-Dopa, Parlodel
At the completion of this Section, you should be able to:

1. Define the classifications of medications that affect the endocrine system.

2. Given a specific medication classification, list at least two (2) side effects.

3. State responsibilities, other than observation for side effects, when administering medications for specific classifications.

4. Describe the difference between insulin shock and diabetic coma, and your responsibilities for each.
The medication classifications which will be discussed in this Section are:

- **Insulin**: Medications by injection, used to treat diabetes mellitus
- **Oral Hypoglycemics**: Oral medications used to treat diabetes mellitus
- **Corticosteroids**: Medications used for inflammatory disorders and to suppress the immune system
- **Sex Hormones**: Medications used to replace needed hormones to treat dysmenorrhea or prostate cancer, and for birth control.
- **Thyroid Hormones**: Medications used to treat thyroid conditions.

**RELATED INFORMATION**

Endocrine glands produce chemicals called hormones which enter the bloodstream directly and are quickly carried to all parts of the body. The hormones regulate and control body activities and growth. There are seven endocrine glands, some of which are in pairs.

**STRUCTURE AND FUNCTION**

**PITUITARY GLAND.** This gland is located under the brain. The hormones secreted by this gland control growth, urine production, contractions of involuntary muscles, and influence the activity of all the other glands. Because it controls other glands, the pituitary is called the “master gland.”

**THE PINEAL BODY.** This is a small gland also located in the skull beneath the brain. Very little is known about this gland. It is thought to be related to sexual growth since it tends to disappear with maturity.

**THE ADRENAL GLANDS.** There are two adrenal glands, on located on each of the two kidneys. They secrete adrenalin and cortisone which are widely used as medications. In general, the adrenal hormones control the water/salt balance in the body and the release of energy to meet emergencies.
REPRODUCTIVE GLANDS (gonads). The term “gonads” refer to the male and female glands. The female glands are the two ovaries located on either side of the uterus. When stimulated by the pituitary gland, they produce two hormones: estrogen and progesterone. These hormones are responsible for the development of female characteristics, such as the development of the breasts, the appearance of pubic and axillary hair, the onset and regulation of menstruation, and pregnancy.

The male gonads, the two testes, are located outside the body in a pouch called the scrotum. They produce the hormone testosterone, which is responsible for the development of male characteristics such as muscular development, deepening voice, and hair growth.

The male and female gonads also produce the special cells (sperm and egg) which unite to form a new person.

THE THYROID GLAND. This gland is found in the neck. The main hormone secreted by this gland is thyroxine which helps to regulate the production of heat and energy in the body. In order for the thyroid gland to produce thyroxine, sufficient iodine must be present in the diet.

THE PARATHYROIDS. These are tiny glands embedded in the thyroid gland in the neck. The hormone they manufacture controls the use of two minerals, calcium and phosphorus, by the body.

THE ISLETS OF LANGERHANS. The Islets of Langerhans are small groups of cells found within the pancreas. These cells produce the hormone insulin. Insulin must be present in order for the body to utilize sugar.

There is a wide variety of medications which affect the endocrine system. The medications are prepared to duplicate the actions of hormones to interfere with the hormonal activity. People who have some type of hormonal deficiency may require medication therapy. For example, the child who is born with a deficiency of growth hormones (produced by the pituitary) may stay small in stature unless the hormone is replaced.

Medications which duplicate hormone activity may also be given to treat various body disorders. For example, a person who has arthritis may benefit from medications called steroids. The actions of steroids resemble actions of the hormone cortisone, which is produced by the adrenal glands.
**DIABETES MELLITUS**

Diabetes is a METABOLIC disease (a condition that interferes with the use of nutrients after digestion) characterized by the body's inability to efficiently burn carbohydrates (starches and sugars) which are needed for energy. This results in high levels of sugar in the blood and urine while the body cells are starved of glucose so the person feels weak and fatigued.

In order for the body to use sugar, insulin must be present. Insulin is a substance produced by special cells in the pancreas called islets of Langerhans. In the body, insulin promotes the following:

1. Transportation of sugar into cells.
2. Control over the rate of sugar used for energy.
3. Storage of sugar in the body for use later.

Insulin also assists with the storage of fat and the stimulation of tissue growth.

When the body does not produce enough, a person will have symptoms of diabetes. The symptoms may be so gradual that the person may not realize anything is wrong. Most common symptoms include:

- increased appetite
- increased thirst
- elevated blood sugar
- excessive urination
- general weakness
- sugar in the urine

Diabetes mellitus is a *chronic lifelong condition* for which there is currently no known cure. Complications can include damage to the retina of the eye, kidney damage, ulcers on the feet which develop into gangrene, hypertension, other cardiovascular disorders, and cataracts.
The aim of treatment is to control or regulate the condition so that the blood sugar levels are as close to normal as possible.

Control can be accomplished by balancing the following factors:

**DIET – MEDICATION – EXERCISE – PHYSICAL WELL BEING**

When these factors are successfully balanced, the person is able to avoid many of the complications of diabetes and live a normal, healthy and productive life.

The American Diabetic Association (A.D.A.) recently (1997) established a new system for classifying diabetes. There are now 4 classifications:

**NEW CLASSIFICATIONS**

1) **TYPE 1 DIABETES MELLITUS**
   - Immune-mediated
   - Idiopathic

   Both types usually lead to insulin administration.

2) **TYPE 2 DIABETES MELLITUS**

   Non Insulin Dependent Diabetes Mellitus (NIDDM), Type 2 Diabetes and Adult Onset Diabetes. Insulin resistance with insulin deficiency.
   - usually adults are obese
   - may be controlled by diet, medication and/or insulin

3) **Other Specific Types**

   Conditions caused by genetic defects
   - Chemical induced diabetes

4) **Gestational Diabetes** – occurs during pregnancy
Whenever a person is taking insulin, there is always a possibility of diabetic coma or insulin shock. Both of these reactions require emergency first aid intervention. The follow chart (6.1) illustrates a comparison between diabetic coma and insulin shock and first aid procedures to follow.

### COMPARISON OF DIABETIC COMA AND INSULIN SHOCK

**CHART 6.1**

<table>
<thead>
<tr>
<th>INSULIN SHOCK (hypoglycemic reaction) (low blood sugar)</th>
<th></th>
</tr>
</thead>
</table>
| **Causes:** | too much insulin  
too little food  
excessive exercise  
vomiting |
| **Onset:** | sudden, within minutes |
| **Signs:** | skin pale, moist  
weak, hungry  
nervousness, headache  
dizziness, visual changes  
alterations in consciousness  
fainting, seizures, coma (late stages) |
| **Blood Sugar:** | low, body lacks sugar |
| **First Aid:** | treat for shock, orange juice, sugar by mouth  
candy under tongue, glucose, transfer to hospital. |

*Never give anything by mouth unless consumer is awake and able to swallow.*
DIABETIC COMA (hyperglycemic reaction)

Causes:  
- too little insulin
- too much food
- illness – increased demand on the body

Onset:  
slow, hours to develop

Signs:  
- skin warm, flushed, dry
- respirations deep and rapid
- fruity odor to breath
- nausea, vomiting, abdominal paid
- alteration in level of consciousness
- lethargic, coma
  (late stages)

Blood Sugar:  
high, too much sugar

First Aid:  
Immediate transfer to hospital as consumer needs insulin and electrolyte replacement.

ORAL HYPOGLYCEMICS

Oral hypoglycemic are medications that are used primarily for Type 2 Diabetics. The reactions discussed in relation to insulin therapy are rare with oral hypoglycemic. However, the possibility of reactions does exist and on must always be alert for signs of shock or coma.

Side effects of oral hypoglycemic may include:

Hypoglycemia, Stomach Upset, Itching, Nausea, Hives, Blood Dyscrasias

Examples:  Micronase, Glucotrol, Diabeta
Consumers who take insulin or oral hypoglycemic should be instructed that these medications do not cure diabetes mellitus. They only control it. Diabetics should follow a prescribed diet, control their weight, be followed by a physician, and have a form of identification stating they are a diabetic.

CORTICOSTEROIDS

The adrenal glands secrete the hormones which control inflammation. When irritation or inflammation is present anywhere in the body, there is an increase in the production of these hormones. If the inflammation is very severe, the adrenals may be unable to secrete an adequate supply to control the inflammation. Additional hormones, called steroids, may be needed when a person has rheumatoid arthritis, bursitis, allergic reactions and other problems.

Steroids will not cure the problem, but merely suppress the symptoms. Upon stopping the medication the symptoms may once again appear. Steroids are used to treat a wide variety of disease processes and do not necessarily affect only the endocrine system.

Corticosteroids are used to treat inflammatory disorders such as rheumatoid arthritis, bursitis, asthma, allergic reactions, and inflammatory intestinal disorders such as ulcerative colitis.

They are also used as hormone replacement therapy; to suppress the immune system to prevent rejection of a transplanted organ; and, in the treatment of some types of cancer.

Some corticosteroid medications are available without a prescription such as in creams used for itching of the skin. Most, however, require a prescription and are taken by mouth or injection.

Always inform the health care practitioner if the person being seen is taking, or has recently taken corticosteroids, as sudden withdrawal may lead to coma or death.
CAUTIONS AND RESPONSIBILITIES WHEN ADMINISTERING CORTICOSTEROIDS

1. When administering steroids watch for signs of infection because corticosteroids decrease the body’s resistance to infection.

2. Corticosteroids are generally administered with milk or food.


4. Long-term treatment with corticosteroids suppresses the body’s natural production of corticosteroids by the adrenal glands.

5. Sudden withdrawal of long-term, high dose corticosteroids may lead to collapse, coma and death.

6. Steroids generally should not be given to consumers with stomach ulcers, active tuberculosis and some severe infections.

POSSIBLE SIDE EFFECTS:

There are a number of possible side effects if the person is on corticosteroids for a long period of time. They include:

- Suppressed immune system increasing susceptibility to disease
- Cataracts
- Puffy face or “Moon Face”
- Changes in mood
- Muscular weakness
- Edema
- Easy bruising of skin
- Abnormal hair growth – hirsutism
- Acne
- Diabetes Mellitus
Examples: **Medrol, Prednisone, Hydrocortisone, Solu-Cortef**

**NOTE:** Long-term, high dose steroids should not be stopped abruptly because sudden withdrawal could lead to collapse, coma, death.

**ORAL CONTRACEPTIVES** (Birth Control Medications)

Oral contraceptives are composed of estrogen and progesterone (hormones secreted by the ovaries). They are used to prevent pregnancy, to relieve pain associated with menstruation, to help regulate menstruation, and to relieve unpleasant symptoms of menopause.

There are many different preparations available and each one has specific directions for use. When administering the medication, a major responsibility is to read the label for directions. Side effects to be alert for are:

- **A**bdominal Pain
- **C**hest Pain
- **H**eadache
- **E**ye Problems
- **S**evere Leg Pain
- Hypertension
- Weight

A – C – H – E – S

The word ACHES will help you remember these symptoms as each symptom begins with the letters used to spell “aches.”
People taking estrogen should be warned that tobacco smoking significantly increases the risk of abnormal blood clotting which may cause pulmonary embolism, stroke or heart attack.

Examples: Ortho-tri-cyclen, Ovral, Ortho-Novum

NOTE: Other forms of contraception such as DepoProvera injections are currently available.
UNIT 2

SECTION 7

MEDICATIONS THAT AFFECT THE GASTROINTESTINAL SYSTEM

OBJECTIVES

At the completion of this Section, you should be able to:

1. Define the classifications of medications that affect the gastrointestinal system.

2. Given a specific medication classification, list at least two (2) side effects.

3. State responsibilities, other than observation for side effects, when administering medications in these classifications.

4. List three (3) common causes of constipation.

5. Identify two (2) conditions under which laxatives should not be given.
The medication classifications which will be discussed in the Section are:

- **Antacids**: Medications which are used to neutralize excess stomach acid
- **Emetics**: Medications used to cause vomiting
- **Antiemetics**: Medications which relieve nausea and vomiting
- **Cathartics**: Medications used to relieve constipation
- **Antidiarrheals**: Medications used to stop diarrhea
- **Histamine Antagonists**: Medications used to inhibit gastric acid secretions
- **Proton Pump Inhibitors**: Medications that block the final step of gastric acid secretion
- **Cytoprotective Agents**: Medications used to coat the stomach
- **Dietary Supplements**: Provide additional nutrients, improve appetite and maintain proper elimination patterns

**RELATED INFORMATION**

The gastrointestinal system is also called the G.I. or digestive tract. It extends from the mouth to the anus and is lined with mucous membrane. The organs of this system change food into simple forms able to pass through the walls of the small intestine into the circulatory system. The circulatory system carries the nutrients to the body. The nondigestible portions of what we eat are moved along the intestines until they are finally excreted from the body as feces. Many organs contribute to the digestive process.
STRUCTURE AND FUNCTION

THE MOUTH
Then entrance to the alimentary canal is the mouth where the teeth, tongue, and jaws begin the process of digestion by mastication (chewing).

Three separate pairs of glands in the mouth secrete saliva which softens and lubricates the food and begins the process of conversion.

THE STOMACH After the food has been chewed and swallowed, it passes to the stomach. The stomach is a hollow, muscular organ where food is mixed with and acted upon by stomach enzymes. In addition to enzymes, the cells of the stomach lining produce hydrochloric acid (HCL), which assists in digestion.

THE INTESTINES When food leaves the stomach it enters the small intestine where any undigested nutrients are broken down by intestinal and pancreatic enzymes and bile from the liver. Materials are moved through the intestines by waves of rhythmic contractions in the intestinal walls. The rhythmic contractions are called peristalsis. Most of the nutrients and food the body needs are absorbed into the bloodstream through the wall of the small intestine.

The small intestine connects to the large intestine (colon). Water is absorbed through the wall of the large intestine, changing wastes to a more solid form. In this way the large intestine helps to maintain the water balance of the body. Peristalsis moves waste through the large intestine until it reaches the rectum. When a certain amount has been collected in the rectum, it is eliminated as feces through the anus.

THE LIVER AND GALLBLADDER The liver is a large gland located on the upper right side of the abdomen just below the ribs. It produces bile, helps remove harmful substances from the blood, detoxifies medications and stores glycogen which it can convert into glucose, the basic fuel of the body. It also produces cholesterol, and stores vitamins and helps to control the amount of proteins in the blood. The gallbladder is a small sac-like organ below the liver. It serves as a storage place for the bile made in the liver. When bile is needed, it is sent from the gall bladder to the small intestines. Bile is yellowish-green, but becomes brown in the intestine and gives stool its typical brown color.

THE PANCREAS This glandular organ extends from behind the stomach into a curve of the small intestine. It manufactures pancreatic juice which is sent to the intestines to aid in the digestion of foods. Remember too, that special cells in the pancreas produce insulin.
Many of the medications discussed in this section can be obtained without a prescription, however, this does not mean that they are harmless. Caution should be used with all medication, particularly because OTC’s can interact with prescribed medications.

**ANTACIDS**

Antacids are medications used to neutralize excess stomach acid. Hydrochloric acid produced in the stomach is necessary for digestion of food. Ordinarily the stomach lining is resistant to breakdown, but under certain conditions (e.g. excessive or prolonged secretion of hydrochloric acid during periods of worry or stress) a small area of the lining may bread down and form a stomach ulcer. Antacids can be used to prevent ulcer formation as well as to treat ulcers and common indigestion referred to as heartburn.

Signs and symptoms of excess stomach acid include:

- Burning in Stomach
- Burping
- Upset Stomach

As you may recall, many medications are irritating to the stomach and the doctor may order an antacid to help reduce stomach irritation. However, it is important to note that antacids may also decrease the absorption of a medication which may change the medication’s effectiveness. Therefore, antacids should be given with water on an empty stomach preferably one hour after meals. It is advisable not to administer any other medication within one to two hours of antacid administration.

**CAUTIONS AND/OR RESPONSIBILITIES WHEN ADMINISTERING ANTACIDS**

The medications are available in liquid or tablet form. Liquid preparations are generally faster acting.

Side effects are minimal but constipation and/or diarrhea can occur when antacids are used over an extended period. Responsibilities include giving the medication on time and in proper relationship to meals and other medication.

Examples: **Maalox, Tums, Riopan**
EMETICS

Emetics are used to cause vomiting and are used primarily as a first aid measure when prompt emptying of the stomach is essential, as with accidental poisoning. When an accidental poisoning occurs, call poison control for directions.

NOTE: The use of emetics should be avoided in cases of corrosive poisoning since tissue damage of the mouth and throat is increased by the second passage of material over these structures. Most cleaning agents are corrosive and have directions if accidental swallowing happens. NEVER GIVE an emetic unless specifically told to by the poison control center, a doctor or a nurse.

One medication which can be prescribed is Syrup of Ipecac. This medication works quickly. Directions for dosage are on the label and should be read very carefully. Many people with children keep Ipecac on hand for emergencies.

ANTIEMETICS

These medications relieve nausea and vomiting. Numerous preparations may be used, but ordinarily the most effective treatment must be chosen based upon the cause of the nausea. Some medications previously discussed in the respiratory system sections may be used as antiemetics.

Some antihistamines, such as Phenergan and Dramamine are also used as antiemetics.

Compazine is used as an antiemetic.

CAUTIONS AND RESPONSIBILITIES WHEN ADMINISTERING ANTIEMETICS

1. Have the person change position SLOWLY to reduce hypotensive effects.

2. Encourage the person to avoid alcohol.

3. Encourage the person to avoid activities requiring alertness.

4. Antiemetics for motion sickness should be given 1 HOUR BEFORE exposure to motion. This gives the medication time to work.

5. Antiemetics should not be taken regularly except under medical supervision as it may mask a serious disorder.

6. Antiemetics should not be taken during pregnancy because they may damage the fetus.
POSSIBLE SIDE EFFECTS:

Drowsiness, Dizziness, Hypotension, Dry Mouth, Blurred Vision, Dry Eyes

Nausea and vomiting may also be treated with household remedies, such as coca cola, warm tea, dry toast, saltine crackers.

Examples: Antivert, Tigan, Emetrol

HISTAMINE ANTAGONISTS

Histamine antagonists inhibit gastric acid secretion and are used in the healing and maintenance treatment of both stomach and duodenal ulcers.

They are also used to treat reflux esophagitis, which is an inflammation of the esophagus caused by regurgitation of stomach contents into the esophagus.

Antacids may be used in conjunction with these medications.

EXAMPLES of histamine antagonists are:

Cimetidine (Tagamet), Pepcid, Axd, Zantac
CAUTIONS AND RESPONSIBILITIES WHEN ADMINISTERING HISTAMINE ANTAGONISTS

1. Encourage the person to avoid alcohol which may increase gastric secretion and worsen disease.
2. Encourage the person to avoid smoking. Smoking may increase gastric acid production.
3. Some histamine antagonists may potentiate other medications (e.g. Aspirin, Dilantin, Inderal, Warfarin).

POSSIBLE SIDE EFFECTS

Confusion, Headache, Dizziness, Constipation, Nausea/Vomiting, Insomnia, Skin Rash, Diarrhea

CYTOPROTECTIVE AGENTS

Cytoprotective agents are medications that coat the stomach lining, protecting it from stomach acid. They are used in treatment of ulcers.

If these medications are used over a long period of time, they may either have a constipating or a laxative/cathartic effect, depending on the medication compound.

EXAMPLES of Cytoprotective medications are:

Carafate, (Sucralfate)

CAUTIONS AND RESPONSIBILITIES WHEN ADMINISTERING CYTOPROTECTIVE MEDICATIONS

1. Antacids interfere with binding of cytoprotective medications. Therefore, the cytoprotective medication should NOT be administered within one hour before or after taking an antacid.

2. It is recommended that cytoprotective medications be given with at least 4 oz. of water on an empty stomach (one hour before each meal and at bedtime).
POSSIBLE SIDE EFFECTS

Constipation

Headache

Skin Rash

Proton Pump Inhibitors

Proton pump inhibitors work by blocking the final step in gastric acid production.

Example: Prilosec (omeprazole), Prevacid (lansoprazole)

Gastric acid pump inhibitors are indicated for treatment of gastric ulcers, duodenal ulcers, gastroesophageal reflux disease (GERD), and pathological hypersecretory conditions.

CAUTIONS AND RESPONSIBILITIES WHEN ADMINISTERING GASTRIC ACID PUMP INHIBITORS:

1. Gastric acid pump inhibitors may interact with Warfarin, Dilantin, and Valium and should be used with caution.

2. Capsule should be taken before eating, preferably in the morning. Capsule should be swallowed whole. Do not chew or crush.

POSSIBLE SIDE EFFECTS:

Headache, Dizziness, Vomiting, Diarrhea, Nausea
CATHARTICS AND LAXATIVES

Cathartics and laxatives are used interchangeably. Laxatives are milder, cathartics are stronger. These medications are used in the treatment of constipation, which is a condition that occurs when fecal material remains too long in the large intestine. The feces becomes hard and causes distention in the lower bowel.

Constipation usually result from one or more of the following causes:

As side effect of certain medications
Improper Diet, Poor Fluid Intake, Lack of Bowel Tone, Tension and Worry, Lack of Exercise

In most cases the correction of one or more of these simple health causes will take care of the constipation problem. In other case, however, cathartics may be ordered. It is important to remember that there is no set time limit between bowel movements. Perfectly healthy individuals may have normal bowel movements no more than every 3-4 days, however, any abnormality in bowel habits should be reported.

CAUTIONS AND/OR RESPONSIBILITIES WHEN ADMINISTERING: CATHARTICS AND LAXATIVES

These medications should never be given if an individual is complaining of abdominal pain, nausea or vomiting. These signs could indicate more serious problems than constipation, such as appendicitis, bowel obstruction, or megacolon.

Cathartics and laxatives may cause the following side effects:

Abdominal Cramps/Pain, Abdominal Distention, Dehydration, Nausea/Vomiting, Diarrhea, Belching

NOTE: Bulk laxatives (Metamucil) can cause obstruction of esophagus, stomach, or small intestine. These should be given with large amounts of water immediately after mixing or it will gel.

Examples: Colace, Pericolace, Dulcolax, Metamucil, FiberCon
ANTI DIARRHEALS

Antidiarrheals are used to treat diarrhea, which is a symptom of a disorder of the bowel associated with rapid passage of feces.

Some causes of diarrhea are:

**Contaminated or Partially Digested Food, Intestinal Infection, Irritable Bowel Syndrome, Certain Allergic Disorder, Some Medications**

In view of these numerous causes, the treatment of diarrhea varies greatly. In some cases, a cathartic that brings about emptying the entire contents of the bowel may be the means to relieve diarrhea because it removes the irritating material.

Simple diarrhea is most frequently due to:

**Poor Eating Habits, Emotional Stress**

**CAUTIONS AND/OR RESPONSIBILITIES WHEN ADMINISTERING: ANTIDIARRHEALS**

The best situation is to try and prevent or rectify the cause of diarrhea. However, medication treatment may be necessary. Most of the antidiarrheals are relatively non-toxic to organs other than the intestines because they are not absorbed into the general circulation.
The most frequent side effect produced by antidiarrheal medications is constipation. Other side effects include: Nausea, vomiting, skin rash.

Antidiarrheals should be administered as prescribed. Many of the medications are nonprescription. Examples: Imodium, Kaopectate, Lomotil

DIETARY SUPPLEMENTS

Dietary supplements include vitamins and minerals, appetite stimulants, and a wide variety of preparations to provide balanced diets for people whose medical, surgical, or psychological condition prevents normal food intake. Some supplements contain fiber.

For those whose condition prevents regular or sufficient food intake, the supplements are available in liquid and semi-liquid form and are used for oral and tube feedings. Oral supplements should be offered between meals for those needing them, so that a supplement does not take the place of a meal.

EXAMPLES of dietary supplements used for those who cannot eat regular food include:

Ensure, Alba-Lybe, Jevity, Ensure Plus, Pulmacare, Suplena

Other dietary supplements are available in tablet, capsule, liquid and powder forms.

EXAMPLES of other types of dietary supplements are: Vitamins, Minerals, Geritol

It is best to try altering diet and portions when feasible, (i.e. small, frequent meals, variety, nutritious snacks between meals) prior to resorting to dietary supplements.

CAUTIONS AND RESPONSIBILITIES WHEN ADMINISTERING: DIETARY SUPPLEMENTS

1. For persons who have difficulty swallowing, be alert for regurgitation and aspiration.

2. Ensure sufficient fluid intake

POSSIBLE SIDE EFFECTS

Diarrhea, Nausea, Abdominal Distention, Constipation, Cramping
At the completion of this Section, you should be able to:

1. Define the classifications of medications that affect the skin and mucous membranes.
2. Given a specific medication category, list at least one (1) side effect.
3. State responsibilities when administering various topical mediations.
RELATED INFORMATION

The skin tells us much about the general health of the body. A fever may be indicated by unusual redness or flushing of the skin. Pallor (less color than normal) is a sign of many conditions. The oxygen content of the blood can be noted quickly by the color of the skin. When the oxygen content is very low, the blood is darker and the skin appears bluish (cyanotic).

STRUCTURE AND FUNCTION

The skin is one of the most important organs in the body as a part of the integumentary system. The integumentary system includes the skin and accessory structures, the hair, nails, nerves, and the sweat and oil glands. The top layer is constantly being washed or worn away as it is renewed from the lower layer.

Functions of the skin include:

Protection: The intact skin is a mechanical barrier to injury and disease.

Heat Regulation: Many small blood vessels are present in the deeper part of the skin (dermis). When they dilate with blood, heat is brought to the surface where it escapes from the body. When heat needs to be conserved, these vessels constrict, thereby preserving heat within the body.

Storage: Energy in the form of fat as well as some vitamins is stored in this vital area.

Elimination: Some waste products as well as excess water are cast off (excreted) as perspiration through the activities of the sweat glands.

Sensory Perception: Many nerve endings are found in the skin. They tell us much about our environment. They respond to heat, cold, pain, and pressure. These nerve endings provide us with our sense of touch.

MUCOUS MEMBRANES

The mucous membranes are continuous with the skin and line all body opening. The mucous membranes secrete mucus, which tends to cover the surface of the membranes, protecting them from foreign bodies and waste materials.
Medications applied to the skin serve many functions and may be intended either for a local effect or for a general effect following absorption through the skin and/or mucous membrane.

The medications may conveniently be divided into the following categories. Medications described in each classification are available without a prescription.

**Cream** An oil-in-water semisolid emulsion, a cream acts as a barrier.

- Examples: **Hydrocortisone, Eucerin**
  - Massage into clean dry skin
  - Observe the consumer’s skin for irritation

**Paste** A stiff mixture of powder and ointment – paste provides a coating of medication and reduces and repels moisture.

- Examples: **Zinc Oxide, Desitin**
  - Apply paste to clean dry skin
  - Cover area to increase absorption and protect clothing

**Ointment** A semisolid suspension of oil and water. It retains heat and provides extended contact with the medication.

- Examples: **Nitrobid, Neosporin, Bacitracin**
  - Apply a thin layer to clear dry skin

**Lotion** A suspension of insoluble powder in water – creates a feeling of dryness

- Examples: **Calamine, Keri**
  - Shake container well before using
  - Massage lotion into skin
  - Observe the skin for irritation
Powder  Inert chemical which may contain medication. Promotes skin’s drying, reduces moisture, maceration and friction

Examples: Tinactin, Zeasorb

RESPONSIBILITIES AND/OR CAUTIONS WHEN APPLYING: SKIN PREPARATIONS

Intact skin prevents contamination. Soap and water is the best first aid to reduce contamination of the skin. Wash hands often and use moisturizer to lubricate skin.

Most skin preparations can be obtained without a prescription, but this does not negate the seriousness of these preparations. Always read the label for directions. The major caution is that they are external medicines and should never be taken internally. Most of the labels will include directions in case of accidental swallowing. In addition, you should be aware of the poison control number in your area.
UNIT 2
SECTION 9
MEDICATIONS THAT AFFECT THE EYE AND EAR

OBJECTIVES

At the completion of this section, you should be able to:

1. Define the classification of medications which affect the eyes.
2. Define the classification of medications which affect the ears.
3. Discuss procedures for administering eye drops.
4. Describe procedure for administering ear drops to an adult.]
The eye. The eye is a hollow ball filled with a semiliquid. The wall of the eye is made up of three layers. A tough, white fibrous, outer coat (the sclera) has a transparent (see-through) portion in the front called the cornea. Beneath the sclera is a vascular layer called the choroid.

Light enters the eye through the cornea. The amount of light entering the eye is controlled by the colored portion of the eye, the iris, found behind the cornea. Fluid between the cornea and iris helps to bend the light rays and bring them to focus on the retina. The opening in the iris is the pupil. The pupil appears black because there is no light behind it. Directly behind the iris is the lens. Small muscles pull on either side of the lens to change its shape. The changing shape of the lens makes it possible for us to adjust the range of our vision from far to near or from near to far.

The eye is held within the bony socket by muscles which can change its position. A mucous membrane (conjunctiva) lines the eyelids and covers the eye. Conjunctivitis is an inflammation of this membrane. The eyelids, eyelashes, and tears protect the delicate eye. Tears are manufactured by a gland in the upper lid.

**CONTENT**

A number of medications are instilled in the eye via ointments and drops. There are also some medications used to irrigate the eyes in cases of infection.

**Proparacaine (Opthaine)** and Alcaine are used for relief of pain. They are available only as eye drops.

**Miotics** are a group of medications which constrict the pupil. Miotics were considered the first step in glaucoma therapy. They have been replaced by beta blockers in the treatment of glaucoma. Example: **Timoptic, Timotol**.

**Mydriatics** dilate the pupil for acute inflammatory conditions or diagnostic purposes. Example: **Neo-synephrine Hydrochloride**

Side Effects: Local irritation, dry mouth (with Miotics only), visual disturbances.
OPHTHALMIC OINTMENTS

Many of the antibiotics are prepared as ophthalmic ointments. e.g. Bacitracin, Aureomycin and Neosporin.

The major responsibilities are to be sure you are:

- Administering the drops to the designated eye and maintain clean technique.
- Washing your hands before and after administering any medication.

Now read the procedure as described in Figure 10.A.

A. To instill ointment, pull down the lower eyelid as the consumer looks upward. Squeeze the ointment into the lower eyelid. Avoid touching the tube to the eye or lid.

B. The consumer should tilt the face upward to receive an eye drop. Use an absorbent tissue to prevent excess drops and tears from flowing down the consumer’s face.

Instructions for Instilling Eye Drops and Ointments

1. Place consumer’s head on a suitable support, such as a firm pillow, and direct his/her face toward the ceiling.

2. Instruct the consumer to fix his/her gaze on a point above his/her head.

3. With clean fingertips, apply gentle traction to the lid bases at the bony rim of the eye. Do not apply pressure to the eyeball.

4. Approach the eye from below with the dropper or the ointment tube, outside the consumer’s field of vision. Do not touch the eye with the dropper or the tube.

5. Release the dose preferably in the middle of the lower lid. Drops should not fall more than one inch before striking the eye.

6. Apply gentle pressure inward and downward against the bones of the nose for about two minutes. This prevents the eye medication from entering the nasal cavity and being absorbed through the nasal cavity.
The Ear. Just as the eye is sensitive to light, the ear is sensitive to sound. The ear has three parts: the outer ear, the middle ear, and the inner ear. The outer ear consists of the part we see, the lobe (pinna), and a canal which directs sound waves to the middle ear. At the end of the canal is the eardrum (tympanic membrane). Sound waves cause the eardrum to vibrate. Three tiny bones, called ossicles, form a chain across the middle ear from the tympanic membrane to an opening in the inner ear. These bones carry the sound waves across the middle ear. A small tube, the eustachian tube leads from the throat into the middle ear. Air carried through this tube helps to keep pressure equal on both sides of the eardrum.

The inner ear is a complex structure having two main parts. One looks somewhat like a coiled snail shell and is called the cochlea. Within the cochlea is the auditory (hearing) nerve which carries sound to the brain to let us know what we are hearing. The second part consists of small canals (semicircular) that contain liquid and nerve endings. The fluid in the canals help us maintain our sense of balance.

Content

Since it is impossible to reach the inner ear duet to the ear drum, conditions such as otitis media (infection in the inner ear) must be treated by oral antibiotics. However, the pain caused by external and middle ear infections may be treated with medications administered as ear drops.

Example: Otobiotic, Cortisporin

Nausea and vomiting are associated with problems in the inner ear. As you recall, this area helps us maintain a sense of balance. It is thought that the reason people develop motion sickness is due to a disturbance in the middle ear. Antiemetics previously discussed, such as Dramamine may be used.
The primary responsibilities when working with ear drops are:

- To maintain clean technique.
- To warm ear drops to body temperature.
- To avoid touch the ear with the dropper.

Review the procedure as illustrated in Figure 10.B.

**Administration of Ear Drops**

1. Allow drops to warm to body temperature by having the consumer hold the bottle in his/her hand for a few minutes.

2. Have the consumer lie on his/her side with the ear to be treated upward.

3. Shake the medicine, if required, and draw up into the dropper.

4. To allow the drops to run in:
   a. Adults – pull the pinna (earlobe) back and up and allow the drops to fall in the external canal.
   b. Children – pull the pinna (earlobe) back and down and allow the drops to fall in the external canal.

5. Do not insert the dropper into the ear and do not allow the dropper to come into contact with any portion of the ear.

6. Have the consumer remain on his/her side for a few minutes to allow the medication to reach the eardrum.

7. Insert a soft cotton plug if recommended. Never pack the plug tightly into the ear.

Following the procedure will assure proper instillation of ear drops.

1. Ask the consumer to turn to side so that the ear being treated faces upward.

2. Manipulate ear to expose the external canal, then direct medicine toward the canal.
At the completion of this section, you should be able to:

1. Define two (2) common symptoms of indigestion.

2. Describe when consumers who have indigestion should be seen by a physician.

3. State when a laxative should not be given.

4. List the main responsibilities when administering or working with consumers who use OTC agents.
RELATED INFORMATION

Over-the-counter (OTC) medications are those that someone can normally buy in a drugstore without a prescription. People tend to think because OTC medications can be purchased without a prescription that they are harmless. This is not true. OTC’s can and do have side effects, some of them serious.

Persons with developmental disabilities have the rights of a citizen, and may purchase OTC medications if he/she is independent in the administration of medication. As caregivers, we have the ethical responsibility to provide and promote a safe situation which helps protect the consumer from unwise or dangerous choices.

For persons who live in residential programs who are not independent in medication administration, it is the job of a doctor, nurse practitioner, or physician’s assistant to determine which OTC medications are safe for these consumers to use. These professional will write orders, specifically describing which OTC a consumer may take, how much they may take, how often they may take it and exactly why they should take the medication.

All agencies have specific policies regarding the use of OTC medications. In general, OTC medications are handled in the same manner as prescription medications, are included in the consumer’s individual program plan, and are recorded on the medication administration record (MAR). As many OTC’s are given as needed (PRN), the agency’s PRN policy will also apply to these medications.

The Office for People with Developmental Disabilities has policies regarding OTC medications. These policies are contained in the regulations referred to as 14 NYCRR 633.17. Below are the policies as contained in these regulations:

633.17 (13) The use of over-the-counter medication is permitted when administered in accordance with the following to ensure that the medication is appropriate and that there will be no expected contraindications:

(i) Approval for a specific individual to use or be administered a medication is received in writing on no less than an annual basis (but in conformance with any other facility specific controlling regulations) from that individual’s practitioner(s) (that is their doctor, nurse practitioner or physician’s assistant).

(ii) There is information in an individual record, and available to staff or the family care provider, as to the condition for which a medication is to be used, the dosage, the frequency with which it may be administered, and any specific instructions related to the medication.

(iii) Administration of an over-the-counter medication does not exceed two days unless so specified by a practitioner, or the practitioner is contacted for instructions for extended use. Exceptions are certain vitamins and over-the-counter medications that a practitioner instructs to be given on a daily basis.
(iv) Nothing in this section shall prevent a person residing in a supportive community residence or a family care home, who is capable of independent self-administration of medication, from obtaining and using over-the-counter medication at his or her discretion. However, the individual shall be given appropriate guidance relative to obtaining and self-administering over-the-counter medications.

633.17 (17) (iii) For the safety of the people residing in or attending a facility and as a support to those staff who have medication administration related responsibilities, there shall be information specific to each person and all medications to be administered to that person while at or under the supervision of the facility and its staff. The sponsoring agency shall ensure maintenance of this information for people in family care homes and provide the information to the family care provider. For each medication a person is taking, this information shall include:

(a) name of the person taking the medication;
(b) name of the medication;
(c) directions with regard to correct dose, form, method/route of administration, time of administration;
(d) start and stop dates, if applicable;
(e) expected therapeutic effects for the person taking the medication;
(f) possible side effects to the person taking the medication; and
(g) name of prescribing, ordering or approving practitioner.

633.17 (19) Storage of medication at the facility.

(i) Medication shall be maintained in the original container in which it was received. All containers shall be labeled. Labels shall be clear and legible.

AGENTS THAT AFFECT THE GASTROINTESTINAL TRACT

It is not unusual to have an occasional sore throat, upset stomach, or other gastrointestinal disorder which is temporary and does not require a call to the physician. Short term use of antacids, laxatives or antidiarrheal medications may be helpful to control a temporary condition. On the other hand, everyone must be aware that these preparations may also mask a more serious health problem. It becomes important to decide when it is time to see a doctor. In this section, we will discuss the more common over-the-counter and home remedies for gastrointestinal disorders.
MOUTHWASHES

A normal healthy mouth should not have an offensive odor. Bacteria normally reside in the mouth and serve many useful functions. The use of mouthwashes simply to cover bad breath can be more harmful than good because the use of mouthwashes will upset the normal bacterial balance in the mouth.

Halitosis (bad breath) usually results from poor dental hygiene. Regular tooth brushing and flossing cure many causes of halitosis. If halitosis continues, the cause could be something more severe, such as an infection of the mouth or throat or a decayed or abscessed tooth. These conditions must be diagnosed and treated by a physician.

INDIGESTION

Indigestion is a term used to mean many things. Common symptoms of indigestion include: Stomach Ache, Nausea, Heartburn, Gas Pains, and Belching.

An occasional case of indigestion which can be related to dietary indiscretion can safely be treated with over-the-counter preparations. However, if indigestion persists or is accompanied by: Labored Breathing, Profuse Perspiration, and Vomiting medical attention should be sought as symptoms of serious heart problems sometimes appear as symptoms of indigestion.

Many OTC preparations used for indigestion have baking soda as the major ingredient. Examples: Alka-Seltzer, Bromo-Seltzer, and Soda Mint.

Another group of antacids contain aluminum hydroxide, a very effective antacid which has an advantage over baking soda because it is absorbed into the blood-stream. Aluminum products can be constipating and are sometimes combined with magnesium preparations to lessen the constipating effect. Examples: Maalox, Gelusil.
As antacid can inhibit the absorption of many medications, only use them on the express order of a physician. Be sure to check the timing of the medication with the doctor or nurse to ensure the antacid is not interfering with any other medication.

**NAUSEA AND VOMITING**

There are several different conditions which can cause nausea. Motion, stomach irritation, and mental stress are just a few. The medication which is used to treat nausea will be chosen by the doctor or RN with the cause of nausea in mind. Some OTC preparations commonly used are: **Maalox, Gelusil, and Pepto-Bismol.**

Motion sickness may be helped by **Dramamine.** Home remedies include dry, dark toast and cola syrup. Most of the other nausea medications are obtainable only on a physician’s prescription and work through an action on the nervous system.

**DIARRHEA**

Diarrhea can be a symptom of many disorders. Often diarrhea is nothing more than a self-limited natural defense reaction by which the body rids itself of a toxic or irritating substance. However, **diarrhea which last for more than one-two days should be reported.**

Antidiarrheal medications work directly on the bowel and are moderately successful in the treatment of diarrhea. Antidiarrheal agents consist of kaolin, charcoal or bismuth. The medications work by absorbing fluid and toxic substances and, therefore, bowel movements become more solid. Some agents are also soothing to inflamed bowels. Examples of the preparations include: **Kaopectate and Immodium.**

Many of the more effective antidiarrheal medications are available by prescription only.

**LAXATIVES**

A regular bowel movement should not be laxative dependent. In order to promote regular bowel movements, consideration should be given to a diet high in roughage and bran, fluid, and adequate exercise. Laxative should never be given to any who has nausea, vomiting, abdominal pain or cramps. Some common examples of laxatives are: **Castor Oil, Bran and Metamucil.**
The regular use of laxatives can cause dependence and the later development of other gastrointestinal disorders. If continued constipation is a problem, it should be reported to the nurse. The nurse and the physician will determine what should be done to relieve the constipation.

**HEMORRHOIDS**

Hemorrhoids are inflamed, dilated blood vessels in the rectum. As the veins dilate and swell, they tend to itch or become painful. Many times hemorrhoids are associated with being overweight, straining during bowel movement, and prolonged standing and/or sitting.

Corrective measures should be aimed at the cause of the hemorrhoids. Diet should be high in roughage and prolonged straining or sitting on the toilet should be avoided.

OTC preparations claim to shrink hemorrhoids and to reduce inflammation, itching and pain. Although some sources claim that most hemorrhoidal preparations do not, in fact, help very much, some people do find these OTC preparations helpful. Preparations come in both ointment and suppository form. Some agents are: **Preparation H, Anusol**.

**AGENTS THAT AFFECT THE RESPIRATORY TRACT**

Other than specific diseases that affect the respiratory tract (such as tuberculosis, infections, emphysema, cancer, etc.), there are many non-specific ailments that produce uncomfortable symptoms. In general, these ailments are not life threatening and the OTC agents which are billed as “aids” or “cures” are not always that successful. These ailments include the effects of chronic smoking, chronic sinus conditions, asthma, allergic responses (hay fever, dust, etc.), or the symptoms of colds and flu.
THE “SNIFFLING, SNEEZING GROUP”

These are agents that affect the nose and nasal passages and consist of an assortment of preparations. As you may recall from your study of medications which effect the respiratory system, whenever the body is attacked by a foreign substance (such as dust, pollen or bacteria), its response is to engorge the tissue with fluids, thus producing swelling, raising the temperature, and perhaps causing pain to make you aware of the invasion. If this attack is in the nose and nasal passages, the antihistamine medications are used to dry the tissue, stop the allergic response and reduce the sense of stuffiness. Some agents are: Contac, Allerest, Chlortrimeton, and Coricidin.

Cautions and warnings should be given with this group of medications as they make one sleepy and less attentive. These effects can be enhanced by alcohol, so alcohol should be avoided. As antihistamines interact with many other drugs, antihistamines must only be given on the written order of a physician, NP or PA.

THE “COUGHING GROUP”

The cough is a useful protective reflex by which the body attempts to clear the respiratory tract of excess materials. Coughing usually accompanies most respiratory diseases, be it a dry throat, a post-nasal drip, or pneumonia.

Most coughing, such as from chronic smoking, irritations, chronic post-nasal drip, or from yelling too much at a sporting event, usually clears up within a few days and is not significant. However, prolonged coughing may also be a symptom of more serious disease and medical attention may be necessary.

Coughing, when treated as a symptom rather than a disease, usually responds to many over-the-counter agents. There are two common types of coughs: productive (wet cough) and non-productive (dry cough). Both can be irritating and even prevent sleep or become forceful enough to cause vomiting. Agents that suppress the cough reflex include: Sucrets, Vicks 44, and Robitussin-DM.
These agents should only be given with the written order of a physician because suppressing the cough may do more damage than good. Cough drops do nothing to control or cure coughs. They only keep the throat area moist and cause you to swallow more often, thereby, soothing the conditions. A piece of hard candy will have the same effect.

**THE “SORO THROAT GROUP”**

As with most of the cold symptoms, you must eliminate the cause, but there are some agents that help you feel better until the cause is corrected. Most aids to correct “sore throats” are in this category. These aids may make you feel better but do nothing to help you get better. They are available as gargles, sprays, lozenges and cough drops. These agents include: **Sucrets, Halls and Lavoris**.

Most mouthwashes are not effective. Probably the most effective gargle is salt in warm water. Sucking on hard candy is almost as effective as most lozenges.

**THE “WHEEZING, TIGHT CHEST GROUP”**

Most wheezing and tight chest symptoms come from difficulty in breathing due to bronchial constriction or physical obstruction due to mucus or disease process. Those agents used to relieve bronchial constrictions are ephedrine-based, such as **Bonkaid, and Primatene Mist**.

**CAUTION:** Some of these medications may cause: An increase in the heart rate and irregular heart rhythms. As with all OTC medications, advice from a physician must be obtained before use.
AGENTS THAT AFFECT THE EYE AND EAR

Since both eyes and ears are very sensitive organs and are very delicate, almost all agents are prescriptive and should be administered under a physician’s direction. However, there are a few that need to be mentioned.

THE EYE

The most common drops are Murine and Visine. These are used to constrict the vessels of the eyeball and reduce minor irritation due to pollen or dust. Prolonged or constant use is not recommended. The best treatment for local eye irritation is to cleanse with plain water.

THE EAR

The most common agents used in the ear soften wax build up or clean out the outer ear such as Debrux which is a carbonide peroxide. Cerumenex is another example. Agents used for minor ear irritation due to swimming (swimmer’s ear) are Ear Dry (contains alcohol and boric acid) and Swim Ear (contains alcohol and glycerin). Caution must be used when flushing the ear canal after using eardrops. It is important that the water be body temperature, and that you do not use too much pressure. If you need to instill ear drops, the nurse will instruct you on the proper technique.

ACHES AND PAINS

At one time or another everyone has an ache or pain. Analgesics (pain relievers) and related agents are the most often purchased medications in the United States. Pain is a warning that something is wrong in the body and should not be overlooked. In this section we will examine the more common aches and pains which can be temporarily or actually relieved with OTC medication.
HEADACH AND FEVER

The number one OTC treatment for headache is acetaminophen, such as Tylenol and Datril. These preparations differ from aspirin in that they are not anti-inflammatory and are not as likely to cause stomach upset. Because these agents lack anti-inflammatory properties, they are not usually indicated in the treatment of those conditions which require anti-inflammatory medications.

Aspirin is used for pain relief particularly pain due to arthritis and other inflammatory diseases. It can cause an upset stomach. To offset the upset stomach give aspirin with milk or buy a preparation of aspirin that is combined with Maalox call Ascriptin. Bufferin is another aspirin preparation which is less irritating to the stomach.

There are other OTC nonsteroidal drugs that have antipyretic, analgesic and anti-inflammatory properties. They include:

1. Ketoprofen (Orudis)
2. Naproxen sodium (Aleve)
3. Ibuprofen (Motrin IB, Advil)

Usually, the difference between brand name and generic products is insignificant.

Analgesics as a general category are responsible for overdoses, but aspirin use has declined especially for children and teenagers due to the potential for Reye’s Syndrome.

For fever control, aspirin or acetaminophen products are probably the best OTC preparation to use. A slightly elevated temperature is nature’s way to help us control mild infections. Recent literature advocates not treating a slightly elevated body temperature, but to instead let a fever run its course. Be sure to follow the doctor’s orders as to when to treat a fever. Typically this will be when the fever is 101 degrees F. or higher. Any person with a fever should have his/her temperature checked every two hours.

Regardless, a very high temperature can be dangerous and should be treated by a physician.
MUSCLE AND JOINT PAIN

There are a group of medications called counter-irritants, which when spread upon the skin, will cause and increase of blood flow to the area. This will create a feeling of warmth and the sensation of pain in the area will be diminished. These agents may be of comfort for people who have strained muscles or have and occasional joint pain. Examples of counter-irritants include: Deep-Heat and Ben Gay. Use these only on the order of a doctor.

TOOTHACHE

Usually, a toothache is a sign of underlying dental problems and the consumer should be examined by a dentist. Until you can get to the dentist, you may be instructed by the dentist or nurse to relieve the discomfort with aspirin or a topical application of Ambesol.

FOOT CARE

A callous is an overgrowth of tissue at a site of constant pressure. A corn is basically the same thing, but is located over the joints and between the toes. Prevention by elimination of undue pressure is very important. Pressure reduction methods include wearing softer and better fitting shoes, form rubber pads, or arch inserts.

Treatment to remove the tissue is sometimes necessary. Most of the over-the-counter preparations have salicylic acid as a base. When applying commercial agents, it is important to avoid the surrounding skin as it may cause a burn.

If corns and callouses are a chronic problem, it is best to seek the services of a physician. Some people, especially diabetics and those with impaired circulation, should always have this problem treated by a physician.
Athlete’s foot is a superficial fungus infection. Good foot hygiene is an essential part of the treatment. Special care must be taken to keep the spaces between the toes clean and dry. OTC preparations which the doctor may order to help athlete’s foot include: Tinactin and Desenex.

SKIN PRODUCTS

Many minor problems affecting the skin may be treated with OTC preparations. Many medications that you have already studied come in preparations intended for skin. What follow is a brief discussion of common problems which can effectively be treated with OTC’s.

SKIN ABRASSIONS

An agent which is intended to kill germs on the skin is called an antiseptic. Many times the only treatment needed for a cut or a scratch is to wash the area carefully with plenty of mild soap and water. The area can be cleansed by washing with iodine based products if the consumer is not sensitive to the products.

If a cut or scratch show sign of infection, it is best to seek medical attention. You may be instructed to use some non-prescription antibiotic creams available for minor infections. Some examples are: Bacitracin, Neosporin, Polysporin

SUNBURN

Sunburn should be prevented. The most effective ingredient to prevent sunburn is PABA, which is contained in many sunscreens. Always read the contents to determine if PABA is present. Many medications you have already studied (tranquilizers) may cause an increased sensitivity to the sun and these people should avoid the sun when possible. Since some people are allergic to PABA, PABA-free products may be necessary.

In the event sunburn occurs, the doctor may order preparations that will temporarily bring some relief. Examples are: Solarcaine, and Unguentine Spray. Oral analgesics such as Tylenol or Motrin may also be ordered for pain relief.
INSECT BITES AND ITCHING

To alleviate itching after the bites have occurred, ice an ice water is probably the cheapest and most effective treatment. Corn starch baths (1 cup to 4 cups water mixed thoroughly, then added to bath water) are also effective for generalized itching. Another agent is a topical liquid – Calamine lotion. It is now possible to purchase skin cream contain a small dose of hydrocortisone. This preparation may also be helpful for other skin problems. One trade name available is Cortaid. Never apply hydrocortisone cream to open sores or broken skin as it may be absorbed into the blood stream.

ACNE

Acne sufferers have a wide range of OTC preparations from which to choose. Since pimples or acne-like conditions result from a variety of causes including foods and medications, it is best to have a physician try to determine the cause of the problem and take his/her advice as to the safest products to purchase.

In summary OTC medications should be treated like any other medication. If you are administering OTC’s to a consumer, there must be a written doctor’s order that tells you:

- The route
- The dosage
- The frequency (how often)
- The reason for administering
- The duration (how many times you can give the medication before calling the nurse or doctor.

The doctor may not write these instructions, but most agencies have policies that limit the number of times OTC and/or PRN medications may be given before notifying the nurse. Check your agency’s policies.)
You may only give OTC’s for the reason the doctor ordered. For example, if there is an order for Tylenol for a fever over 101 degrees, you may not give it for a headache or menstrual pain without first getting permission from the doctor.

Be sure that you understand the intended effect, and side effects of any OTC that you administer.

Be sure to sign for all OTC’s that you administer on the medication administration record (MAR) just like you would for a prescription medication.
UNIT 2

SECTION 11

VITAMINS AND MINERALS

OBJECTIVES

At the completion of this section, you should be able to:

1. Recognize the role diet plays in supplying vitamins and minerals.

2. List four (4) situations when supplemental vitamins and minerals may be required.

3. State your responsibility when administering vitamins and minerals.

4. Define Hematinic medications.

5. List two (2) side effects of Hematinics.

6. Describe two (2) ways to reduce side effects of Hematinics.
VITAMINS AND MINERALS

Vitamins are substances that regulate body processes. You probably know them by their letter names: A, B-complex, C, D, E and K. Vitamins help to build strong teeth and bones, promote growth, aid normal body functioning, and strengthen resistance to disease.

Minerals help to build tissue, especially bones and teeth. They also regulate body fluids, such as blood and digestive juices. The minerals we need in our daily diet include calcium, phosphorus, sodium, iodine, iron and fluoride.

CONTENT

Vitamins and minerals are present in a wide variety of foods. A balanced diet usually provides enough vitamins and minerals and it is not necessary to take additional vitamins. However, there are some periods when it is necessary to take additional vitamins and minerals, such as during times of: Poor Nutrition, Pregnancy, Menopause, Periods of Growth, and Illness.

Also, there are conditions that prevent adequate absorption of vitamins and minerals from the gastrointestinal tract.

CAUTIONS AND/OR RESPONSIBILITIES WHEN ADMINISTERING: VITAMINS AND MINERALS

The best situation is to encourage consumers to eat a nutritionally sound diet. However, if a physician orders vitamins and minerals for a consumer, your major responsibilities are:

Follow the Label Directions

and

Store Vitamins in a Cool, Dark Place
HEMATINICS

Iron is a mineral which is very important in the formation of hemoglobin. Of all the minerals, supplemental iron will probably be the required most. Iron preparations fall into the medication classification of HEMATINICS.

As with all other vitamins and minerals, we generally consume an adequate amount of iron in a well-balanced diet. However, during periods of illness, pregnancy, poor nutrition, and rapid growth, supplemental iron preparations may be ordered by a physician.

CAUTIONS AND/OR RESPONSIBILITIES WHEN: ADMINISTERING HEMATINICS

As with most medications, hematinics have some common side effects which include:

Abdominal Cramping and Constipation and Diarrhea and Nausea

These side effects can be reduced if hematinics are given right after meals and the consumer is encouraged to drink a minimum of six glasses of fluid per day. There may be a need for laxatives or stool softeners.

Hematinics will cause stools to turn a tarry black color. This is harmless, but it is important to tell the consumer that this will occur. In addition, liquid iron preparations should be given through a straw, as they can stain the teeth. The following table lists two common hematinics (Chart 2.11.3).