This Batten Disease Handbook is compiled with information from many sources concerning the topics included. Families in the organization have also contributed their specific situations that have been helpful in their own battle with Batten Disease. All material in this book is provided for information purposes only. Although Batten Disease Support and Research Association (BDSRA) has made every reasonable effort to assure the accuracy of the information contained in this book, BDSRA is not engaged in rendering medical or other professional services and advice. BDSRA does not guarantee or warrant that the information in the book is complete, correct, current, or applicable to every situation. BDSRA disclaims all warranties express or implied, concerning this book and the information contained herein. If medical or other expert assistance is required, the services of a competent professional should be attained.

Thank You

Nancy Carney, RN  
Batten Disease Support and Research  
2008
MEDICATION BOOK

To use this Medication Book is much easier in this revised issue.

If you have the paper copy of the book, the page numbers are listed across from the medication or the topic, so you can easily flip to the page you are interested in.

If you have the CD version of the book, simply hold down the control (ctrl) key and click on the topic or drug you wish to read about and it will take you there. It also tells you that when you put your mouse or arrow on the desired topic. All of the underlined topics will go directly to that topic. The glossary and the bibliography will also go to their respective topics, but under the one main topic, not under each letter of the alphabet, for example.

The only medications that I did not go into a lot of details on is the antacid/ulcer/gastritis ones. There are so many on the market that you can purchase over the counter today that are good – example, Zantac, Tagamet, Pepcid, etc. I did do a couple of them in the book, and they are basically the same when it comes to side effects etc.

If you need more information on any drug, whether it is in this book or not, please call me or email me for more information.

I hope this has made it much easier for you as families to be able to read and learn about the specific medications your children are taking. Should you still have questions and are unsure of the drug, please feel free to contact myself, call your pharmacist, or call your Physician.

Thank You!

Nancy Carney RN
2008
# MEDICATION BOOK
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NURSING PROCESS GUIDELINES RELATED TO DRUG ADMINISTRATION

The delivery of medical care today is in a constant state of change and sometimes in crisis. The population is aging, resulting in more chronic disease and more complex care issues. The population is transient, resulting in unstable support systems, fewer at home care providers and helpers. At the same time, medicine is undergoing a technological boom (CAT scans, MRI's, experimental drugs). Patients are being discharged earlier from the acute care facility or not being admitted at all for procedures that used to be treated in the hospital with follow up support and monitoring. Patients are becoming more responsible for their own care and for following complicated medical regimens at home.

Nursing is a unique and complex science and a nurturing and caring art. In the traditional sense, nurses have always been seen as ministering to and soothing the sick. In the current state of medical changes, nursing also has become more technical and scientific. Nurses have had to assume increasing responsibilities involved not only with nurturing and caring, but with assessing, diagnosing, intervening with patients to treat, prevent, and educate to help people cope with various health states.

The nurse deals with the whole person - the physical, emotional, intellectual, and spiritual aspects - considering the ways that a person responds to treatment, disease, and the change in lifestyle that may be required by both. The nurse is the key health care provider in a position to assess the patient - physical, social, and emotional aspects - to administer therapy and medications, teach the patient how best to cope with the therapy, to ensure the most effectiveness, and evaluate the effectiveness of therapy. This requires a broad base of knowledge in the basic sciences (anatomy, physiology, nutrition, chemistry, pharmacology), the social sciences (sociology, psychology), and education (learning approaches, evaluation).

Although all nursing theorists do not completely agree on the process that defines the practice of nursing, most conclude certain key elements in the nursing process. These elements are the basic components of the decision making or problem solving process: assessment (gathering of information), diagnosis (defining that information to arrive at some conclusions), and intervention (administering, education, comfort measures), and evaluation (determining the effects of the
interventions that were preformed). The use of this process each time a situation arises ensures a method of coping with the overwhelming scientific and technical aspects that each patient brings to the situation. Using the nursing process format in each instance of drug therapy will ensure that the patient receives the best, most efficient, scientifically based holistic care.

ASSESSMENT
The first step of the nursing process is the systemic, organized collection of data about the patient. Because the nurse is responsible for holistic care, these data must include information about physical, intellectual, emotional, social, and environmental factors. They will provide the nurse with information needed to plan discharge, plan educational programs, arrange for appropriate consultations, and monitor physical responses to treatment or to disease. In actual clinical practice, this process never ends. The patient is not in a steady state, but is dynamic, adjusting to physical, emotional, and environmental influences. Each nurse develops a unique approach to the organization of the assessment; an approach that is functional and useful in the clinical setting and that makes sense to that nurse and that clinical situation.

Drug therapy is a complex, integral, and important part of health care today, and the principles of drug therapy need to be incorporated into every patient assessment plan. The particular information that is needed and that should be assessed will vary with each drug, but the concepts involved are similar and are based on the principles of drug therapy. Two important areas that need to be assessed are history and physical presentation.

HISTORY
Past experiences and past illnesses impact the actual effect of a drug.

Chronic Conditions: These may be contraindicated to the use of a drug or may require that caution be used or that drug dosage be adjusted.
Drug Use: Prescription drugs, over the counter drugs, street drugs, alcohol, nicotine, and caffeine all may have an impact on the effect of a drug. Patients often neglect to mention over the counter drugs, herbal and alternative therapy, and contraceptives, not considering them actual drugs, and should be asked specifically about the use of over the counter drugs, herbals and contraceptives.
**Allergies:** Past exposure to a drug or other allergens can predict a future reaction or note a caution for the use of a drug, food, or animal product.

**Level of Education:** This information will help to provide a basis for patient education programs and level of explanation.

**Level of Understanding of Disease and Therapy:** This information will direct the development of educational information.

**Social Supports:** Patients are being discharged earlier than ever before and often need assistance at home to provide care and institute and monitor drug therapy.

**Financial Supports:** The financial impact of health care and the high cost of medications need to be considered when prescribing drugs and depending on the patient to follow through with drug therapy.

**Pattern of Health Care:** The way that a patient seeks health care will give the nurse valuable information to include in educational information. Does this patient routinely seek follow up care or wait for emergency situations?

**PHYSICAL ASSESSMENT**

**Weight:** Weight is an important factor when determining if the recommended dosage of a drug is appropriate. The recommended dosage is based on the 150 lb adult male. Patients who are much lighter or much heavier will need a dosage adjustment.

**Age:** Patients at the extremes of the age spectrum, pediatric and geriatric, often require dosage adjustments based on the functional level of the liver and kidneys and the responsiveness of other organs.

**Physical Parameters Related to the Disease State or Known Drug Effects:** Assessment of these factors before beginning drug therapy will give a baseline level with which future assessments can be compared to determine the effects of drug therapy. The specific parameters that need to be assessed will depend on the disease process being treated and on the expected therapeutic and adverse effects of the drug therapy. Because the nurse has the greatest direct and continual contact with the patient, the nurse has the best opportunity to direct the minute changes that will determine the course of drug therapy and therapeutic success or discontinuation because of adverse or unacceptable responses.

**NURSING DIAGNOSIS**

Once data has been collected, the nurse must organize and analyze that information to arrive at a nursing diagnosis. A nursing diagnosis is simply a statement of the patient’s status from a nursing perspective. This statement directs appropriate nursing interventions. A nursing diagnosis will show actual or
potential alteration in patient function based on the assessment of the clinical situation. The nursing diagnoses that are related to drug therapy must be incorporated into a total picture of the patient. In many cases, the drug will not present a new nursing diagnosis, but the desired effects and adverse effects related to each drug given should be considered in the nursing diagnosis for each patient.

**INTERVENTIONS**

The assessment and diagnosis of the patient’s situation will direct specific nursing interventions. Three types of interventions are frequently involved in drug therapy administration, provision of comfort measures, and patient/family teaching.

**Drug Administration**

**Drug:** Ensuring that the drug being administered is the correct dose, of the correct drug, at the correct time, and is being given to the correct patient, is standard nursing practice.

**Storage:** Some drugs require specific storage environments (refrigeration, protection from light).

**Route:** Determining the best route of administration is often determined by the prescription of the drug. Nurses can often have an impact on modifying the prescribed route to determine the most efficient route and the most comfortable one for the patient based on his or her specific situation. When establishing the prescribed route, it is important to check the proper method of administering a drug by that route.

**Dosage:** Drug dosage may need to be calculated based on available drug form, patient body weight or surface area, or kidney function.

**Preparation:** Some drugs require specific preparation before administration. Oral drugs may need to be shaken, crushed; parenteral drugs may need to be reconstituted or diluted with specific solutions; topical drugs may require specific handling before administration.

**Timing:** Actual administration of a drug may require coordination with the administration of other foods, or physical parameters. The nurse, as the caregiver most frequently involved in administering a drug, must be aware and juggle all of these factors and educate the patient to do this on his or her own.

**Recording:** Once the nurse has assessed the patient, makes the appropriate nursing diagnoses, and delivered the correct drug by the correct route, in the correct dose, and at the correct time, that information needs to be recorded in accordance with the local requirements for recording medication administration.
**Comfort Measures:** Nurses are in the unique position to help the patient cope with the effects of drug therapy.

**Placebo Effect:** The anticipation that a drug will be helpful (placebo effect) has been proved to have tremendous impact on actual success of drug therapy, so the nurse’s attitude and support can be a critical part of drug therapy. A back rub, a kind word, a positive approach may be as beneficial as the drug itself.

**Side Effects:** These interventions can be directed at decreasing the impact of the anticipated side effects of the drug and promoting patient safety. Such interventions include environmental control (temperature, lighting), safety measures (avoiding driving, avoiding the sun, using side rails) or physical comfort (skin care, laxatives, frequent meals).

**Lifestyle Adjustment:** Some drug effects will require that a patient change his or her lifestyle to cope effectively. Diuretic users may have to arrange the day to be near restroom facilities when the drug works. MAOI (Monoamine Oxidase Inhibitors) users have to adjust their diet to prevent serious drug side effects.

**EDUCATION**

With patients becoming more responsible for their own care, it is essential that they have all of the information necessary to ensure safe and effective drug therapy at home. Many states now require that the patient be given written information. Key elements that need to be included in any drug education include the following:

**Name, dose, and action of drug.** With many people seeing more than one health care provider, this information is important for ensuring safe and effective drug therapy.

**Timing of administration.** Patients need to know specifically when to take the drug with regard to frequency, other drugs, and meals.

**Special storage and preparation instructions.** Some drugs require particular handling that the patient will need to have spelled out.

**Specific over the counter drugs or alternative therapies to avoid.** Many people do not consider these to be actual drugs and may inadvertently take them and cause unwanted or even dangerous drug-drug reactions. Spelling out particular problems of which to be aware will help the patient avoid these situations.

**Special comfort or safety measures that need to be considered.** Alerting the patient to ways of coping with anticipated side effects will prevent a great deal of anxiety. The patient also may need to be alerted to the need to return for followup tests or evaluation.
Safety measures. All patients need to be alerted to keep drugs out of the reach of children. They also need to be reminded to tell any health care provider whom they see that they are taking this drug. This can prevent drug-drug interactions and misdiagnosing based on drug effects.

Specific points about drug toxicity. Warning signs of drug toxicity of which the patient should be aware of, should be listed. He or she can be advised to notify the health care provider if any of these side effects occur.

Specific warnings about drug discontinuation. Some drugs with a small margin of safety and drugs with particular systemic effects cannot be stopped abruptly without dangerous effects. Patient’s taking these drugs need to be alerted to the problem and encouraged to call immediately if they cannot take their medication for any reason (illness, financial).

EVALUATION

Evaluation is part of the continual process of patient care that leads to changes in assessment, diagnosis, and intervention. The patient is continually evaluated for therapeutic response, the occurrence of drug side effects, and the occurrence of drug-drug, drug-food, drug-laboratory test or drug-alternative therapy interactions. The efficacy of the nursing interventions and the education program must be evaluated. In some situations, the nurse will evaluate the patient simply by reapplying the beginning steps of the nursing process and analyzing for change. In some cases of drug therapy, particular therapeutic drug levels need to be evaluated as well.
TAKING CONTROL OF MEDICATIONS

Since we have to be parent advocates for our children, we need to have the knowledge for ourselves as well as the medications that our children are taking. Once a Physician has diagnosed a medical or surgical problem and the Pharmacist has dispensed the prescription medication, the power and the responsibility for taking this medication shifts to the patient or to we as parents for our children. Parents have to make decisions about their medications every day, but they can only make wise decisions if they have the right kind of information. Parents need to know what to do should side effects occur. Side effects need to be explained to where parents can understand and recognize that the benefits of the medications are greater than the risks they are personally willing to take due to the side effects. The cost to purchase prescriptions is minuscule when compared to the cost of treating the complications that result when people do not know how to take their medications correctly. In 2000, the total cost of prescriptions in the United States was approximately 111 billion dollars. The estimated cost to treat complications resulting from home medication errors totaled 177 million dollars in extra medical treatments provided by hospitals, Physicians, and nursing homes. Add to that at least 100 billion dollars to cover employee costs resulting from absenteeism and loss of productivity from home medication errors. No dollar amount can be put on the most important outcome - the loss in the patient's quality of life.

Medicine Tip - patient’s taking chewable Vitamin C should brush their teeth or rinse their mouth after each dose - the ascorbic acid in the tablets can stick to the teeth and over time erode the enamel.

Don’t be afraid to ask questions - you need to know what information is important to obtain from health professionals on how to incorporate the medicines into your daily life style, how to manage side effects, when to seek medical help and how to keep tract of important information for the Physician and the Pharmacist. Ask the Physician “why” the medication is needed and how it is going to help you or your child. If you do not want to take the medications or give them to your child, discuss it until you can reach an acceptable form of treatment. Ask your Physician or Pharmacist if there is a FDA approved Patient Package Insert (PPI) for the medicine you are taking. The average person forgets 50% of what the Physician tells you by the time he reaches the pharmacy - ask the
Pharmacist to go over the directions again in a private counseling area if you wish, to ensure confidentiality and better learning.

Ask the Physician or Pharmacist to show you the actual medicine, so you know which medicine is used to treat what symptom.

Many people stop taking a medicine because they think they are allergic to it. It takes 2 - 3 weeks for some medications to be effective - you may have a minor side effect, but make sure you know all of the side effects of a particular drug and keep asking questions until you understand it. Some allergic reactions can be serious and require immediate medical treatment - so call your Physician or Pharmacist immediately. Some medicines, like inhalers, may be complicated to use - ask the Pharmacist to show you or let you practice in his presence to assure proper usage.

A prescription label that states “take one tablet 3 times a day” does not give you enough information - ask for specific instructions so you can work out the dosage schedule into your daily activities, meal times, and work schedules.

Try not to adjust your medicines, or skip doses without discussing it with your Physician or Pharmacist - some medications can have serious side effects if they are stopped suddenly.

Many prescriptions medication can interact with each other as well as with other over the counter products and herbal remedies. Make so your Physician and Pharmacist know what you are treating for and ask them about the possible interactions before you start them.

**Medicine Tip** - people with asthma should not carry their inhalers in their pockets. Some patients have required surgery because they inhaled coins that have gotten stuck in their inhaler.

Some find it helpful to keep a “medicine diary” they can take with them to their next Physician or Pharmacist’s visit - this can help with possible side effects you may be having or important questions you want to ask.

Some medicines must be stored away from heat, light, or moistures, in order to keep their strengths. Trans dermal patches should not be thrown away where kids can find them and put them on like bandaids. Do not store medications in the glove box of your car - heat can destroy the medicine.

Select your Pharmacist with the same care you choose your Physician - you want someone who will take the time to counsel you and not give you bad answers. You should expect written information from the pharmacy - keep it in a handy place that is easily accessible.
Find out how many days in advance you should order your refills. Ask the Pharmacist to develop a program to help remind you to get your refills. If you are having trouble remembering to take your medications, it is important to tell your Physician - if you do not tell him, he may think the medication is not working and prescribe another medicine that is less effective and with more side effects - all you may need is a more convenient dosing schedule. Be sure to tell the Pharmacist at each visit if you are having any problems with your medications. He can often provide helpful advice.

These tips are sponsored by the U.S. Food and Drug Administration entitled, “Safe Medical Treatments: Everyone has a role.” For more information, please visit the following website: www.consumer-health.com
Asking the **RIGHT**

**QUESTIONS about medication SAFETY**

Did you administer a drug today, even an Aspirin? Regardless of the medication, you took a risk, because giving a drug safely involves many steps, some beyond your control.

In this article, the explanation to what questions to ask to help minimize medication errors will be explained. It will test your critical thinking skills and help you get answers to the *Who, What, When, Where, Why, and How* of drug therapy.

**Who’s giving orders here?**
The medication order is the first step in the drug administration process. Accept an order only from a health care provider who has appropriate licensure and credentials to practice in your state and who’s authorized to prescribe drugs in your health care agency. Typically, this includes a Physician, Nurse Practitioner, Physician Assistant, and Dentist. Some facilities permit Clinical Pharmacists to order drugs and appropriate lab tests based on established physician approved protocols.

**What’s right for my child?**
Make sure the medication order contains all the necessary components: your child’s name plus the drug name, dose, frequency of administration, and route. Both hard to read orders and similar drug names are common sources for error. If an order is illegible or you have questions, do not administer the drug until you call your Physician for clarification.

Some orders are based on established protocols, such as bowel protocols in long term care facilities. If you receive such an order, be sure to specify the drug name, its dosage, frequency, time, and route on the medication administration record.
Once you are clear about the order, check your child’s record for any allergies to the medication or similar medications and find out if he takes any over the counter medications, supplements, or herbs. These could affect the response to the prescribed drug.

**When should I administer the drug?**
Consult your agency’s policy for appropriate medication administration times; keeping in mind that scheduling should be flexible to meet the child’s needs. Some drugs should be taken with food or after meals to maximize their effectiveness or minimize adverse reactions.

Consider drug-drug interactions, too. For example, if your child needs three cardiovascular drugs once a day, you may need to stagger them to prevent an adverse drug-drug interaction. Some cardiovascular drugs cause bradycardia and hypotension, and receiving three at once could increase the risks.

The Pharmacist may recommend dosing times based on the physiologic processes that follow predictable patterns. For example, bronchial patency and airflow are typically decreased in the early morning and at their peak in the afternoon. For this reason, one dose of Theophylline in the evening may be more effective than multiple doses throughout the day. Similarly, some antihypertensive agents must be given at a specific time to reach their peak effect at the correct time.

**Where’s the medication?**
In a hospital, the pharmacy generally delivers needed drugs to each nursing unit at scheduled times. Your facility may use one of the approaches to dispense them:
- A unit dose system of individually wrapped doses kept in the medication cart.
- A multidose system, in which one container holds many doses.
- Stock medications commonly used for the patients in the unit; these drugs are kept on hand and replenished by the pharmacy as needed.
- A drug dispensing machine (DDM) that remains in the unit. Storing commonly used drugs or prescribed patient doses, it can automatically charge the patient and record that you gave him a drug and when.
Always check your drug for its expiration date and discard an expired drug. Be sure to tell your Pharmacist as well.
Where do you keep your child’s medications at home? Are they all in one place? Make sure you get them refilled ahead of time so you will not run out!
Why this drug for my child?
You need to know the therapeutic effect of any drug you give your child and whether it is appropriate for his condition. If you are not familiar with a drug, look it up. Also review pertinent data that affect whether you can safely administer it, such as blood pressure, lab results, and pain level for your child.
Could giving the drug harm your child? What is a safe dose for his age and weight? If the ordered dosage is not within the recommended range, clarify the order with the Physician.

How should I administer it?
Wash your hands before you prepare any medication. When preparing a unit dose oral medication, do not open the package until you enter your child's room. Then, if he refuses the medication, you can return it to the bottle. Always adhere to the "five rights" of medication administration: These five rights are especially important if more than the parents are giving your child medications.

**Right patient.** Check his armband and room ID card. If he is alert and oriented, ask him to tell you his name. Make so he is alert to avoid choking.

**Right drug.** For a unit dose medication, check the label twice against the order on the medication record. Use a triple-check method for multi dose medications. Tell your child the name of any drug you are giving him and the reason if appropriate. This gives him a chance to point out anything unusual, such as he has already taken it or the dose is not what other nurses have been giving him. If he raises any doubt, recheck the original medication order for possible error.

**Right dose.** Make sure the ordered dose is within the recommended range and call your Physician for clarification if is not. If you need to calculate a dose, have another nurse independently calculate it. If you have questions about the calculation, check with the Pharmacist.

**Right time.** Give the drug within an hour of its scheduled time or according to your time schedule. If consistent serum levels of a drug are critical, such as for anticonvulsants, antibiotics, anticoagulants, and analgesics, give the dose as close to the scheduled time as possible.

**Right route.** Administer the drug by the ordered route. If the route is not specified, clarify it before you administer the medication. When your child takes an oral medication, stay with him while he swallows it. Do not leave it at his bedside unless the order specifies self administration.
Any cautions about older adults?
A good rule of thumb regarding drug dosing for older adults is to “start low, go slow”. Changes related to aging can alter drug distribution and excretion. If your child is now an adult, he may take many drugs, as many older people do, polypharmacy may affect his responses. You should also be aware than an older adult might deny pain or fail to ask for an analgesic because he fears becoming addicted. If pain medication has been ordered for your child/adult, administer it on a continual regimen rather than as needed, depending on your particular situation.

Best practice for older adults. Drug dosing for older adults should start low and be titrated slowly to achieve the desired results. The following factors may affect how your child/adult responds.

**Body composition.** Drug distribution is determined by the amounts of fat, muscle, and water in the body. Older adults typically have more fat, less muscle, and less water stores than younger people. If a drug has an affinity for storage in fat (as do the Benzodiazepines, Diazepam and Lorazepam) the child/adult may retain the drug and respond adversely. Be sure that your child/adult has adequate subcutaneous tissue when selecting a site for subcutaneous injections or application of transdermal patches that deliver medication through subcutaneous tissue.

**Protein stores.** Older adults tend to have lower serum albumin levels, so drugs that need protein to be effective such as Digoxin (heart) and Phenytoin (Dilantin) may not produce the desired response unless the child/adult receives supplemental protein.

**Kidney clearance and liver metabolism.** With aging, the kidneys’ ability to clear wastes and the liver’s ability to metabolize certain substances may decrease, causing drug metabolites to remain in the body. Be very careful in administering Meperdine (Demerol - pain) to your child/adult because it may accumulate and cause confusion and lethargy. If you observe responses to any drug, notify the Physician immediately to have the drug discontinued or the dose reduced. Also, assess your child/adult’s renal and liver function, study results regularly. Notify the Physician of any abnormalities.

**Altered sensitivity.** Older children/adults have increased or decreased sensitivity to certain drugs. For example, Opioids, Anticholinergics, Dopamine Antagonists, Antihypertensives, and Benzodiazepines can have a stronger effect than expected. Beta-blockers, insulin, and beta agonists may have a lesser effect.
**Chewing and swallowing problems.** Some older children/adults have lost teeth and may not have dentures; others may have swallowing problems caused by strokes or other health problems. For a child/adult like this, you may need to crush medications and add them to applesauce or pudding. Be sure to check which can be safely crushed or use liquid medications. Check for swallowing ability before giving oral medications. If your child/adult has had a stroke, liquid medications may be risky. You also could use a preparation called Thick It to thicken liquids to the consistency your child/adult may be able to swallow the liquids/medications. Request a swallowing evaluation and recommendation from the speech/language pathologist. Allow the child/adult extra time to take oral medications.

**What about documentation?**
Right documentation is often called the sixth “right” of medication administration. Most health care agencies use an administration record to document when drugs are given and most require you to write in the data. Always document administering a drug after giving it, not before. If the administration time differs from the prescribed time, not the times and explain why. If you do not give a medication, initial the appropriate space, circle your initials, and follow your agency’s policy to document why it was not given. Use only black or dark blue ink because they reproduce well.

If a medication error occurs, immediately assess your child for problems and monitor him continuously if necessary. Tell your nurse/manager, notify the Physician and complete a medication error report or other designated form. Follow your agency’s policy for additional interventions.

After you document giving a drug, continue to monitor your child for expected and unexpected responses. For example, does he report less pain after receiving pain medication? If the medication is not effective, contact the Physician.

If your child develops an unexpected or undesired response, such as a rash, nausea, or itching, reports the reaction to the Physician and the pharmacy. Document your interventions in response to the adverse reaction and check with your Physician for specific actions to take.

Answers that make sense. Administering medications is a complex process. By investigating the factors that could contribute to errors, you safeguard your practice and protect your child.
ANTIANXIETY/TRANQUILERS

Action/Kinetics:

Benzodiazepines are the major anti-anxiety agents. They are thought to affect the limbic system and reticular formation to reduce anxiety by increasing or facilitating the inhibitory neurotransmitter activity of GABA (gamma aminobutyric acid). Two Benzodiazepines receptor subtypes have been identified in the brain - BZ1, BZ2. BZ1 is believed to be associated with sleep mechanisms, whereas BZ2 is associated with memory, motor, sensory, and cognitive function. When used for 3-4 weeks for sleep, certain Benzodiazepines may cause REM rebound when discontinued. The Benzodiazepines possess varying degrees of anticonvulsant activity, skeletal muscle relaxation, and the ability to alleviate tension. The Benzodiazepines generally have long half-lives (1 - 8 days), thus cumulative effects can occur. Several of the Benzodiazepines are metabolized in the liver, which prolongs their duration of action. Benzodiazepines are widely distributed throughout the body. Approximately 70 - 99% of an administered dose is bound to plasma protein. Metabolites of Benzodiazepines are excreted through the kidneys. All tranquilizers have the ability to cause psychological and physical dependence. Benzodiazepines have a wide margin of safety between therapeutic and toxic doses.

Indications

Management of anxiety disorders, short term relief of symptoms of anxiety. Short term treatment of insomnia. Alone or as adjunct in treatment of Lennox Gastaut Syndrome (petit mal seizures) who have not responded to Succinimides; up to 30% of patients show loss of effectiveness of drug within 3 months of therapy (may respond to dosage adjustment) Unlabeled use; treatment of panic attacks, periodic leg movements during sleep, hypokinetic dysarthria, acute manic episodes, multifocal tic disorders, adjunct treatment of schizophrenia, neuralgias, treatment of irritable bowel syndrome.

Contraindications:

Hypersensitivity, acute narrow-angle glaucoma, psychoses, primary depressive disorders, psychiatric disorders in which anxiety is not a significant symptom.
Special Concerns:
Use with caution in impaired hepatic or renal function and in the geriatric or debilitated patient. Geriatric patients may be more sensitive to the effects, may see over sedation, dizziness, confusion, or ataxia. When used for insomnia, rebound sleep disorders may occur following abrupt withdrawal of certain Benzodiazepines.

Side Effects:
CNS: Drowsiness, fatigue, confusion, ataxia, sedation, dizziness, vertigo, depression, apathy, lightheadedness, delirium, headache, lethargy, disorientation, hypo activity, crying, amnesia, slurred speech, stupor, coma, fainting, difficulty in concentration, euphoria, nervousness, irritability, akathisia, hypotonia, vivid eyes, glassy eyed, hysteria, suicide attempt, psychosis, paradoxical excitement manifested by anxiety, acute excitability, increased muscle spasticity, insomnia, hallucinations, sleep disturbances, rage, and stimulation.

Cardiovascular: Hypertension, hypotension, bradycardia, tachycardia, palpitations, edema, cardiovascular collapse

Respiratory: Respiratory depression and sleep apnea, especially in patients with compromised respiratory function

GI: Increased appetite, constipation, diarrhea, nausea, vomiting, anorexia, weight gain or loss, dry mouth, bitter or metallic taste, increased salivation, coated tongue, difficulty in swallowing, gastritis, incontinent of stool

GU: Difficulty in urination, urinary retention, incontinence, dysuria, enuresis

EENT: Diplopia, conjunctivitis, nystagmus, blurred vision

Dermatology: Urticaria, rash, pruritus, alopecia, hirsutism, dermatitis, edema of the ankles and face

Other: Anemia, joint pain, lymphadenopathy, muscle cramps, paresthesia, dehydration, lupus like symptoms, sweating, shortness of breath, flushing, hiccups, fever, hepatic dysfunction
Overdose Management

Symptoms:
Severe drowsiness, confusion with reduced or absent reflexes, tremors, slurred speech, staggering, hypotension, shortness of breath, labored breathing, respiratory depression, impaired coordination, seizures, weakness, slow heart rate, coma. Note: geriatric patients, debilitated patients, young children and patients with liver disease are more sensitive to the CNS (central nervous system) effects of Benzodiazepines

Treatment:
Supportive therapy in the event of an overdose, have an antagonist (Flumazenil - Romazicon, which after anesthesia or conscious sedation will give the patient complete or partial reversal of the sedative effects of Benzodiaepines) readily available, gastric lavage, provided that an ET (endotracheal) tube with an inflated cuff is used to prevent aspiration of vomitus. Emesis only if drug ingestion was recent and the patient is fully conscious, activated charcoal and saline cathartic may be given after emesis or lavage, maintain adequate respiratory function, reverse hypotension by IV fluids, Norepinephrine (Levophed - severe hypotension), or Metaraminol (Aramine - hypotension). Do not treat excitation with Barbiturates

NURSING CONSIDERATIONS

Administration/Storage:
1. Persistent drowsiness, ataxia, or visual disturbances may require dosage adjustment
2. Lower dosage is usually indicated for older patient
3. GI (gastrointestinal) effects are decreased when drugs are given with meals or shortly afterward
4. Withdraw drugs gradually

Assessment:
1. Document indications for therapy, onset of symptoms, and behavioral manifestations. Note: any prior treatments, what was used, for how long, and the outcome
2. List drugs currently prescribed to ensure none interact unfavorably. Note: any adverse reactions to this class of drugs
3. Assess life style and general level of health. Note: any situations that may contribute to these symptoms
4. Assess the manner in which the patient responds to questions/problems
5. Monitor CBC, liver and renal function studies, assess for blood dyscrasias, or impaired function
6. Review physical and history for any contraindications to therapy

Interventions:
1. Document any symptoms consistent with overdose
2. Report any complaints of sore throat (other than those caused by NG (nagogastric) or ET (endotrachial) tubes), fever or weakness and assess for blood dyscrasias, check CBC
3. Monitor blood pressure before and after IV administration of antianxiety medications, keep patient lying down for 2 - 3 hours after IV dose given
4. Administer the lowest possible effective dose, especially if elderly or debilitated
5. When hospitalized and administered orally, remain at bedside until swallowed
6. If patient exhibits ataxia or weakness or lack of coordination, when ambulating, provide supervision/assistance. Use siderails once in bed and identify at risks for falls

Note: any signs and symptoms of jaundice: nausea, diarrhea, upper abdominal pain, or the presence of high fever, check liver function tests

7. Report if yellowing of the eyes or skin, or mucous membranes (evident in the late stages of jaundice or a biliary tract obstruction), hold if overly sleepy/confused or becomes comatose
8. With suicidal tendencies, anticipate drug will be prescribed in small doses, report signs of increased depression immediately
9. If history of alcoholism or if taking excessive quantities of drugs, carefully supervise amount of drug prescribed and dispensed, assess for manifestations of ataxia, slurred speech, and vertigo (symptoms of chronic intoxication and that patient may be exceeding dosage)

Note: any evidence of physical or psychological dependence, assess frequency and quantity of refills

Patient/Family Teaching:
1. These drugs may reduce ability to handle potentially dangerous equipment such as cars or machinery
2. Take most of the daily dose at bedtime, with smaller doses during the waking hours to minimize mental/motor impairment.

3. Avoid alcohol while taking antianxiety agents. Alcohol potentiates the depressant effects of both alcohol and the medication.

4. Do not take any unprescribed or over the counter medications without approval.

5. Arise slowly from a lying position and dangle legs over the side of the bed before standing, if feeling faint, sit/lie down immediately and lower the head.

6. Allow extra time to prepare for daily activities, take precautions before arising, to reduce one source of anxiety and stress.

7. Do not stop taking drug suddenly, any sudden withdrawal after prolonged therapy or after excessive use may cause a recurrence of the preexisting symptoms of anxiety, anorexia, insomnia, vomiting, ataxia, muscle twitching, confusion, and hallucinations, and may develop seizures and convulsions.

8. Identify/practice relaxation techniques that may assist in lowering anxiety levels.

9. These drugs are generally for shortterm therapy, follow up is imperative to evaluate response and the need for continued therapy.

10. Attend appropriate counseling sessions as condition and length of therapy dictates.
**ATIVAN/LORAZEPAM**  
*(Antianxiety)*

**Indications:** Anxiety, tension, agitation, irritability, particularly in anxiety neuroses or organic disorders

**Actions:** May potentiate the effects of GABA (gamma aminobutyric acid), depress the CNS (central nervous system), and suppress the spread of seizure activity

**Adverse Reactions:**
- **CNS:** Drowsiness, sedation, amnesia, insomnia, agitation, dizziness, weakness, unsteadiness, disorientation, depression, headache
- **Cardiovascular:** Transient hypotension
- **EENT:** Visual disturbances, nasal congestion
- **GI:** Abdominal discomfort, nausea, change in appetite

**Dosage:**
- No dosage listed for children except 0.05 mg/kg to 0.1 mg/kg per IV route for status epilepticus, but we know that Ativan is used very widely in the world of Batten Disease - from 0.5 mg to 45 mg/day with very few side effects. For adults the dosage is 2 mg to 6 mg oral daily in divided doses. Maximum, up to 10 mg/day for adults, daily. Each indication may vary in dosages. Available forms of Ativan are injectable: 2 mg/ml and 4 mg/ml; oral solution (concentrated): 2 mg/ml; tablets are in 0.5 mg, 1 mg, and 2 mg. The oral route of onset is in 1 hour with a peak of 2 hours and a duration of 12 - 24 hours. The IV route has an onset of 5 minutes, a peak of 60 - 90 minutes and a duration of 6 - 8 hours. And the IM route has an onset of 15 to 30 minutes with a peak of 60 - 90 minutes and a duration of 6 to 8 hours.

**Nursing Considerations:** Keep emergency resuscitation equipment and oxygen available.
- Dilute with an equal volume of sterile water for injection, normal saline solution for injection, or D5W. Give slowly at no more than 2 mg/minute.
- Monitor respirations every 5 to 15 minutes and before each IV dose.
- Contains Benzyl Alcohol. Avoid use in neonates. Benzyl Alcohol has been linked to Leukemia and Lymphoma (cancers). Pharmaceuticals, among other industries use it in preparations.
for making some medications including Ativan (antianxiety).
-Refrigerate intact vials and protect from light.
-CNS (central nervous system) Depressants may increase CNS (central nervous system) depression. Use together cautiously.
-Digoxin (heart) may increase Digoxin (heart) level and risk of toxicity. Monitor patient and Digoxin (heart) level closely.
-Kava (herb) may increase sedation. Discourage use together.
-Alcohol use may cause additive CNS (central nervous system) effects. Discourage use together.
-Smoking may decrease drug's effectiveness. Monitor patient closely.
-May increase liver function test values.
-Contraindicated in patients hypersensitive to drug, other Benzodiazepines, or the vehicle used in parenteral dosage form: and in patients with Acute Angle Closure Glaucoma.
-Use cautiously in patients with pulmonary, renal, or hepatic impairment.
-Use cautiously in elderly, acutely ill, or debilitated patients.
-For IM use, inject deeply into a muscle. Do not dilute.
-Refrigerate parenteral form to prolong shelf life.
-Monitor hepatic, renal, and hematopoietic function periodically in patients receiving repeated or prolonged therapy.
-Use of this drug may lead to abuse and addiction. Do not stop abruptly after long term use because withdrawal symptoms may occur.
-Do not confuse Lorazepam (Ativan - antianxiety) with Alprazolam (Xanax - antianxiety).
-When used before surgery, drug causes substantial preoperative amnesia. Patient teaching requires extra care to ensure adequate recall. Provide written materials or inform a family member, if possible.
-Warn patient to avoid hazardous activities that require alertness or good coordination until effects of drug are known.
-Tell patient to avoid alcohol while taking drug.
-Warn patient not to stop drug abruptly because withdrawal symptoms may occur.
BUSPAR/BUSPIRONE HYDROCHLORIDE
(Antianxiety)

Indication: Anxiety
Action: May inhibit neuronal firing and reduce Serotonin turnover in
cortical, amygdaloid, and septohippocampal tissue
Adverse Reactions: CNS: Dizziness, drowsiness, headache, nervousness, insomnia,
lightheadedness, fatigue, numbness
CV: Tachycardia, nonspecific chest pain
EENT: Blurred vision
GI: Dry mouth, nausea, diarrhea, abdominal distress
Dosages: 7.5 mg twice a day. Increase dosage by 5 mg daily to 2 - 3 day
intervals. Usual maintenance dosage is 20 mg to 30 mg daily in
divided doses. Do not exceed 60 mg daily. Available forms are
tablets: 5 mg, 10 mg, 15 mg, and 30 mg. Peak level is 40 to 90
minutes.
Nursing Considerations: Azole Antifungals may increase first pass metabolism of
Buspar (antianxiety). Monitor patient closely for adverse
effects; adjust dose as needed.
-CNS (central nervous system) Depressants may increase CNS
(central nervous system) depression. Use together cautiously.
-Drugs metabolized by CYP3A4 (Erythromycin - antibiotic),
Nefazodone (Serzone - an antidepressant not recommended
for children with Batten Disease) may increase Buspar
(antianxiety) level. Monitor patient; decrease Buspar
(antianxiety) dosage and adjust carefully.
-MAO (Monoamine Oxidase) Inhibitors may elevate blood
pressure. Avoid using together.
-Grapefruit juice may increase drug level, increasing adverse
effects. Give with liquid other than grapefruit juice.
-Alcohol use may increase CNS (central nervous system)
depression. Discourage use together.
-Contraindicated in patients hypersensitive to drug and within 14
days of MAO (Monoamine Oxidase) Inhibitor therapy.
-Drug is not recommended for patients with severe hepatic or
renal impairment.
-Monitor patient closely for adverse CNS (central nervous
system) reactions. Drug is less sedating than other Anxiolytics,
but CNS (central nervous system) effects may be unpredictable.
- Before starting therapy, do not stop a previous Benzodiazepine regimen abruptly because a withdrawal reaction may occur.
- Drug shows no potential for abuse and is not classified as a controlled substance.
- Do not confuse Buspirone (Buspar - antianxiety) with Bupropion (Wellbutrin - antidepressant).
- Warn patient to avoid hazardous activities that require alertness and good coordination until effects of drug are known.
- Remind patient that drug effects may not be noticeable for several weeks.
- Warn patient not to abruptly stop a Benzodiazepine because of risk of withdrawal symptom.
- Tell patient to avoid alcohol during therapy.
TRANXENE/CLORAZEPATE DIPOTASSIUM
(Antianxiety, Anticonvulsant)

Indications: As a sedative for children with Batten Disease, for anxiety and tension, adjunct for treating partial seizures, management of alcohol withdrawal

Action: Thought to potentiate the effects of GABA (gamma aminobutyric acid), an inhibitory neurotransmitter, and other neurotransmitters at excitatory synapses to occur at doses well below those necessary to cause sedation, ataxia

Adverse Reactions: CNS: Drowsiness, dizziness, lethargy, sedation, depression, fatigue, nervousness, confusion, irritability, headache, slurred speech, difficulty articulating words, stupor, rigidity, tremor, poor coordination
Cardiovascular: transient hypotension, hypertension, palpitations
EENT: Blurred or double vision
GI: Dry mouth
Hematologic: Neutropenia
Hepatic: Jaundice
Skin: Skin rash, diaphoresis
Other: Weight gain or loss, drug dependence or tolerance

Dosages: Initially, 7.5 mg orally twice a day; increase by no more than 7.5 mg/week. Do not exceed 60 mg/day for children 9 - 12. For children older than 12 and adults initially, 7.5 mg oral three times a day; increase by no more than 7.5 mg/week. Do not exceed 90 mg/day. Each indication may vary in dosages. Available forms include: capsules 3.75 mg, 7.5 mg, and 15 mg; tablets 3.75 mg, 7.5 mg, 11 25 mg, 15 mg, and 22.5 mg. The drug has a rapid onset with a peak of 1 - 2 hours and a duration of days.

Nursing Considerations: Contraindications are those with a hypersensitivity to Benzodiazepines, Acute Angle Closure Glaucoma, Psychosis. Concurrent Ketoconazole (Nizoral) or Itraconazole (Sporonox) both antifungals, therapy, and children younger than age 9.
-Precautions - use cautiously in depression or suicidal ideation, psychotic reaction, elderly patients, or in females
of childbearing age.

- If GI (gastrointestinal) upset occurs, give with food.
- When discontinuing therapy after long term use, taper dosage gradually over 4 to 8 weeks to avoid withdrawal symptoms.
- Take suicide precautions if patient is depressed or anxious.
- Antacids altered Tranxene (anticonvulsant/sedation) absorption rate.
- Antidepressants, Antihistamines, Opioids, additive CNS (central nervous system) depression.
- Barbiturates, MAO (Monoamine Oxidase) Inhibitors, other Antidepressants, Phenothiazines, potentiation of Tranxene (anticonvulsant/sedation) effect.
- Cimetidine (Tagamet - stomach), Disulfram (Antabuse - alcohol abstinence), Fluoxetine (Prozac - antidepressant), Hormonal Contraceptives, Isoniazid (antitubercular), Itraconazole (Sporonox - fungal), Ketoconazole (Nizoral - fungal), Metoprolol (Toprol - heart), Propoxyphene (Darvon - pain), Propranolol (Inderal - heart), Valproic Acid (Depakote - anticonvulsant), decreased Tranxene (anticonvulsant/sedation) metabolism, causing enhanced drug action or markedly increased CNS (central nervous system) effects.
- Levodopa (Parkinson’s Disease) decreased antiparkinsonian effect.
- Probenecid (antigout) has a rapid onset or prolonged action of Tranxene (anticonvulsant/sedation).
- Rifampin (antitubercular) increased metabolism and decreased efficacy of Tranxene (anticonvulsant/sedation).
- Theophylline (bronchospasm) decreased sedative effect of Tranxene (anticonvulsant/sedation).
- Alanine aminotransferase, alkaline phosphatase, aspartate aminotranferase increased levels.
- Chamomile, hops, kava, skull cap, valerian (all herbs) increased CNS (central nervous system) depression.
- Alcohol use increased CNS (central nervous system) depression.
- Smoking decreased drug absorption.
- Evaluate patient for depression, drug dependence, and drug tolerance.
- Monitor blood counts and liver function test results during long term therapy; drug may cause Neutropenia and Jaundice.
- Instruct patient to avoid driving and other hazardous activities until he knows how drug affects concentration and alertness.
- Tell patient to avoid smoking and use of alcohol or other CNS (central nervous system) Depressants.
- Caution patient not to stop therapy abruptly, because withdrawal symptoms may occur.
- As appropriate, review all other significant and life threatening adverse reactions and interactions, especially those related to the drugs, tests, herbs, and behaviors mentioned above.
**TRAZODONE/ DESERYL**

*(Antianxiety)*

**Indication:** Major depression with and without anxiety, also in treating aggressive behavior

**Action:** Unclear. Thought to selectively inhibit Serotonin and Norepinephrine uptake in the brain; not a tricyclic derivative

**Adverse Reactions:**

- CNS: Drowsiness, confusion, dizziness, fatigue, headache, insomnia, nightmares, syncope, weakness, tremor, nervousness, hostility, anger, vivid dreams
- Cardiovascular: Orthostatic hypotension, hypertension, palpitations, tachycardia, shortness of breath, EKG changes
- EENT: Blurred vision, tinnitus, nasal congestion
- GI: Nausea, vomiting, constipation, dry mouth, anorexia, dysgeusia
- GU: Hematuria, increased urinary frequency
- Hematologic: Anemia
- Skin: Rash, urticaria, diaphoresis

**Dosages**

50 mg three times a day. May increase by 50 mg every 3 or 4 days until desired response occurs. Do not exceed 400 mg/day as an outpatient or 600 mg in a hospitalized patient. Available forms are 50 mg, 100 mg, 150 mg, and 300 mg. The oral route has an onset of 1 – 2 weeks with a peak of 2 - 4 weeks and the duration is weeks.

**Nursing Considerations:**

- Amphetamines, Buspirone (Buspar - anxiety), Dextromethorphan (Robitussin - antitussive), Dihydroergotamine (Migranal – vascular headache), Lithium salts (Lithium - antipsychotic), Meperidine (Demerol - pain), SSRIs (Selective Serotonin Norepinephrine Reuptake Inhibitors), Duloxetine (Cymbalta - antidepressant), Venlafaxine (Effexor - antidepressant), Sumatriptan (Imitrex - migraines), Tramadol (Ultram - pain), Tricyclic Antidepressants, Tryptophan (amino acid) may increase the risk of Serotonin Syndrome. Avoid combining drugs that increase the availability of Serotonin in the CNS (central nervous system): monitor patient closely if used together.
- Antihypertensives may increase hypotensive effect of Trazodone (antianxiety). Antihypertensive dosage may need to
be decreased.

- Clonidine (Catapres - antihypertensive), CNS (central nervous system) Depressants may enhance CNS (central nervous system) depression. Avoid using together.
- CYP3A4 inducers (Carbamazepine - Tegretol - anticonvulsant) may reduce Trazodone (antianxiety) level. Monitor patient closely; may need to increase Trazodone (antianxiety) dose.
- CYP3A4 inhibitors (Ketoconazole - Nizoral - fungal) may slow the clearance of Trazodone (antianxiety) and increase Trazodone (antianxiety) level. May cause nausea, hypotension, and fainting. Consider decreasing Trazodone (antianxiety) dose.
- Digoxin (heart), Phenytoin (Dilantin - anticonvulsant) increased blood levels of these drugs.
- MAO (Monoamine Oxidase) Inhibitors - effects unknown. Use together with extreme caution.
- Protease inhibitors (Amprenavir - antiretroviral, Atazanavir - antiretroviral, Fosamprenavir - antiretroviral, Indinavir - antiretroviral, Lopinavir - antiretroviral, Ritonavir - antiretroviral, Nelfinavir - antiretroviral, Saquinavir - antiretroviral) may increase Trazodone (antianxiety) levels and adverse effects. Monitor patient and adjust Trazodone (antianxiety) dose, as needed.
- Ginkgo Biloba may cause sedation. Discourage use together.
- St. John’s Wort (herb) may cause Serotonin Syndrome. Discourage use together.
- Alcohol use may enhance CNS (central nervous system) depression. Discourage use together.
- May increase ALT and AST levels. May decrease hemoglobin level.
- Contraindications to hypersensitivity to the drug.
- Contraindicated if patient is in the recovery period after a myocardial infarction (heart attack), and in patients at risk for suicide.
- Give drug after meals or a light snack for optimal absorption and to decrease risk of dizziness.
- Record mood changes. Monitor mood changes. Monitor patient for suicidal tendencies and allow only minimum supply of drug.
- Drug may increase the risk of suicidal thinking and behavior of
children and adolescents with major depressive disorder or other psychiatric disorder.
- Do not confuse Trazodone (antianxiety) with Tramodol (Ultram – pain).
- Warn patient to avoid activities that require alertness and good coordination until effects of drug are known. Drowsiness and dizziness usually subside after first few weeks.
VALIUM/DIAZEPAM
(Antianxiety, Anticonvulsant)

Indications: Anxiety, acute alcohol withdrawal, before endoscopic procedures, muscle spasms, preoperative sedation, cardioversion, adjunct treatment for seizure disorders, status epilepticus, severe recurrent seizures, and patients on stable regimens of antiepileptic drugs who need Diazepam (Valium - anticonvulsant/antianxiety) intermittently to control bouts of increased seizure activity

Action: A Benzodiazepine that probably potentiates the effects of GABA (gamma aminobutyric acid), depresses the CNS (central nervous system), and suppresses the spread of seizure activity

Adverse Reactions: CNS: Drowsiness, dysarthria, slurred speech, tremor, transient amnesia, fatigue, ataxia, headache, insomnia, paradoxical anxiety, hallucinations, minor changes in EEG patterns
Cardiovascular: Cardiovascular collapse, bradycardia, hypotension
EENT: Diplopia, blurred vision, nystagmus
GI: Nausea, constipation, diarrhea with rectal form (Diastat)
GU: Incontinence, urine retention
Hematologic: Neutropenia
Hepatic: Jaundice
Respiratory: Respiratory depression, apnea
Skin: Rash
Other: Pain, phlebitis at injection site, physical or psychological dependence

Dosages: 1 mg - 2.5 mg orally three or four times a day, increase gradually as needed and tolerated for children age 6 months and older. For adults - depending on severity, 2 mg to 10 mg orally 2 to 4 times a day, or 2 mg to 10 mg IM or IV every 3 to 4 hours as needed. For each indication the dosage may vary.
Available forms: injection 5mg/ml; oral solution 5 mg/ml, 5 mg/5 mg; rectal gel twin packs 2.5 mg (pediatric), 5 mg (pediatric), 10 mg, 15 mg (adult), 20 mg (adult); tablets 2 mg, 5 mg, and 10 mg. The oral route has an onset of 30 minutes with a peak of 2 hours and a duration of 20 - 80 hours; the IV
route has an onset of 1 - 5 minutes with a peak of 1 - 5 minutes and a duration of 15 - 60 minutes; the IM route has a peak of 2 hours and the rectal route (Diastat) has a peak of 90 minutes.

Nursing Considerations: If status epilepticus occurs - **IV ACCESS is needed immediately.**

- IV route is more reliable parenteral route; IM route is not recommended because absorption is variable and injection is painful.
- Keep emergency resuscitation equipment and oxygen at bedside.
- Avoid infusion sets or containers made from polyvinyl chloride.
- If possible, inject directly into a large vein. If not, inject slowly through infusion tubing as near to the insertion site as possible. Give at no more than 5 mg/minute. Watch closely for phlebitis at injection site.
- Monitor respirations every 5 to 15 minutes and before each dose. Do not store parenteral solution in plastic syringes.
- Cimetidine (Tagamet - stomach), Disulram (Antabuse - managing chronic alcoholism), Fluoxetine (Prozac - antidepressant), Fluvoxamine (Luvox - antidepressant), Hormonal Contraceptives, Isoniazid (antitubercular), Metoprolol (Toprol - heart), Propoxyphene (Darvon - pain), Propranolol (Inderal - heart), Valproic Acid (Depakote - anticonvulsant) may decrease clearance of Valium (anticonvulsant/antianxiety) and increase risk of adverse effects. Monitor patient for excessive sedation and impaired psychomotor function.
- CNS (central nervous system) Depressants may increase CNS (central nervous system) depression. Use together cautiously.
- Digoxin (heart) may increase Digoxin (heart) level and risk of toxicity. Monitor patient and Digoxin (heart) level closely.
- Diltiazem (Cardiazem - heart) may increase CNS (central nervous system) depression and prolong effects of Valium (anticonvulsant/antianxiety). Reduce dose of Valium (anticonvulsant/antianxiety).
- Fluconazole (Diflucan), Itraconazole (Sporonox), Ketoconazole
Nizoral), Miconazole (Monistat) all antifungals - may increase and prolong Valium (anticonvulsant/antianxiety) level, CNS (central nervous system) depression, and psychomotor impairment. Avoid using together.

- Levadopa (antiparkinsonism) may decrease Levadopa (antiparkinsonism) effectiveness. Monitor patient.

- Phenobarbital (Luminal - anticonvulsant/sedation) may increase effects of both drugs. Use together cautiously.

- Kava (herb) may increase sedation. Discourage use together.

- Alcohol use may cause additive CNS (central nervous system) effects. Discourage use together.

- Smoking may decrease effectiveness of drug. Monitor patient closely.

- May increase liver function test values. May decrease neutrophil count.

- Contraindicated in patients hypersensitive to drug or soy protein; in patients experiencing shock, coma, or acute alcohol intoxication (parenteral form); in pregnant women, especially in first trimester, and in children younger than age 6 months (oral form).

- Diastat (Valium) rectal gel (anticonvulsant/sedation) is contraindicated in patients with Acute Angle Closure Glaucoma.

- Use cautiously in patients with liver or renal impairment, depression, or Chronic Open Angle Glaucoma. Use cautiously in elderly and debilitated patients.

- Use Diastat (Valium) rectal gel (anticonvulsant/sedation) to treat no more than five episodes per month and no more than one episode every five days because tolerance may develop.

- When using oral solution, dilute dose just before giving.

- Only caregivers who can distinguish cluster of seizures or events from the patient's ordinary seizure activity, who have been instructed and can give the treatment competently, who understand which seizures may or may not be treated with Diastat (Valium) rectal gel (anticonvulsant/antianxiety), and who can monitor the clinical response and recognize when immediate professional and medical evaluation is needed should give Diastat (Valium) rectal gel (anticonvulsant/antianxiety).

- Monitor periodic hepatic, renal, and hematopoietic function
studies in patients receiving repeated or prolonged therapy.
- Monitor elderly patients for dizziness, ataxia, mental status changes. Patients are at an increased risk for falls.
- Use of this drug may lead to abuse and addiction. Do not withdraw drug abruptly after long term use; withdrawal symptoms may occur.
- Do not confuse Diazepam (Valium - anticonvulsant/antianxiety) with Diazoxide (Hyperstat - an antihypertensive). Warn patient to avoid activities that require alertness and good coordination until effects of drug are known.
- Tell patient to avoid alcohol while taking drug.
- Notify patient that smoking may decrease drug’s effectiveness.
- Warn patient not to abruptly stop drug because withdrawal symptoms may occur.
- Instruct patient’s caregiver on the proper use of Diastat (Valium) rectal gel (anticonvulsant/antianxiety).
VERSED/MIDAZOLAM HYDROCHLORIDE
(Antianxiety)

Indication: Preoperative sedation (to induce sleepiness or drowsiness and relieve apprehension). Conscious sedation before short diagnostic or endoscopic procedures. To induce sleepiness and amnesia and to relieve apprehension before anesthesia or before and during procedures. To induce general anesthesia. As continuous infusion, to sedate intubated patients in critical care unit.

Action: May potentiate the effects of GABA (gamma aminobutyric acid), depress the CNS (central nervous system), and suppress the spread of seizure activity.

Adverse Reactions: CNS: Oversedation, drowsiness, amnesia, headache, involuntary movements, nystagmus, paradoxical behavior or excitement
CV: Variations in blood pressure and pulse rate
GI: Nausea, vomiting
Respiratory: Apnea, decreased respirations rate, hiccups
Other: Pain at injection site

Dosage:
PO - Children ages 6 to 16 who are cooperative: 0.25 to 0.5 mg/kg po (orally) as a single dose, up to 20 mg. Infants and children ages 6 months to 5 years or less cooperative, older children: 0.25 to 1 mg/kg po as a single dose, up to 20 mg.
IV - Children ages 12 to 16: initially, no more than 2.5 mg IV given slowly; repeat in 2 minutes, if needed, in small increments of first dose over at least 2 minutes to achieve desired effect. Total dose of up to 10 mg may be used. Additional doses to maintain desired level of sedation may be given by slow titration in increments of 25% of dose used to first reach the sedation end point. Children ages 6 to 12: 0.025 to 0.05 mg/kg IV over 2-3 minutes. Additional doses may be given in small increments after 2 or 3 minutes. Total dose of up to 0.4 mg/kg, not to exceed 10 mg, may be used. Children ages 6 months to 5 years: 0.05 to 0.1 mg/kg IV over 2-3 minutes. Additional doses may be given in small
increments after 2 or 3 minutes. Total dose of up to 0.6 mg/kg, not to exceed 6 mg, may be used.

IM - Children: 0.1 to 0.15 mg/kg IM. Use up to 0.5 mg/kg in more anxious patients.

In patients younger than 60: initially, small dose not to exceed 2.5 mg IV given slowly; repeat in 2 minutes, if needed, in small increments of first dose over at least 2 minutes to achieve desired effect. Total dose of up to 5 mg may be used. Additional doses to maintain desired level of sedation may be given by slow titration in increments of 25% of dose used to first reach the sedative end point.

In patients age 60 or older and debilitated patients: 0.5 - 1.5 mg IV, over at least 2 minutes. Incremental doses should not exceed 1 mg. A total dose of up to 3.5 mg is usually sufficient.

Available forms: injection, 1 mg/ml, 5 mg/ml; syrup, 2 mg/ml. The oral route has an onset of 10 to 20 minutes with a peak of 45 to 60 minutes and a duration of 2 to 6 hours; the IV route has an onset of 90 seconds to 5 minutes, a rapid peak and a duration of 2 to 6 hours; the IM route has an onset of 15 minutes, a peak of 15 to 60 minutes and a duration of 2 to 6 hours.

Nursing Considerations: CNS (central nervous system) depressants may cause apnea. Use together cautiously. Adjust dosage of Versed if used with Opiates or other CNS (central nervous system) depressants.

- Cardiazem (Dilitazem) may increase CNS (central nervous system) depression and prolong effects of Versed. Use lower dose of Versed.
- Erythromycin may alter metabolism of Versed. Use together cautiously.
- Diflucan (Fluconazole), Sporanox (Itraconazole), Nizoral (Ketoconazole), Nystatin (Miconazole) may increase and prolong Versed level, CNS (central nervous system) depression, and psychomotor impairment. Avoid using together.
- Hormonal contraceptives may prolong half-life of Versed.
Use together cautiously.
- Rifampin (antitubercular) may decrease Versed level. Monitor for Versed effectiveness.
- Theophylline (Bronchodilator) may antagonize sedative effect of Versed. Use together cautiously.
- Verapamil (Calan - heart) may increase Versed level. Monitor patient closely.
- St. John's Wort may decrease drug level. Discourage use together.
- Grapefruit juice may increase bioavailability of oral drug. Discourage use together.
- Alcohol use may cause additive CNS (central nervous system) effects. Discourage use together.

Contraindicated in patients hypersensitive to drug and in those with acute angle-closure glaucoma, shock, coma, or acute alcohol intoxication.
- Use cautiously in patients with uncompensated acute illness and in elderly or debilitated patients.
- Have oxygen and resuscitation equipment available in case of severe respiratory depression. Excessive amounts and rapid infusion have been linked to respiratory arrest. Continuously monitor patient, including children taking syrup form, for life-threatening respiratory depression.
- When injecting IM, give deeply into a large muscle.
- Monitor blood pressure, heart rate and rhythm, respirations, airway integrity, and arterial oxygen saturation during procedure.
- Because drug diminishes patient's recall of events around the time of surgery, provide written information, family member instructions, and follow-up contact.
- Warn patient to avoid hazardous activities that require alertness or good coordination until effects of drug are known.
VISTARIL/HYDROXYZINE HYDROCHLORIDE
(Antianxiety)

Indication: Anxiety, preoperative and postoperative adjunctive therapy for sedation, pruritis from allergies, psychiatric and emotional emergencies, and nausea and vomiting

Action: Suppresses activity in certain essential regions of the subcortical area in the CNS (central nervous system)

Adverse Reactions: CNS: Drowsiness, involuntary motor activity
GI: Dry mouth, constipation
Other: Pain at IM injection site, hypersensitivity reactions

Dosages: 50 mg to 100 mg four times a day. Children age 6 and younger: 50 mg daily in divided doses. Each indication may vary in dosage. Available forms: capsules - 10 mg, 25 mg and 50 mg; Injection - 25 mg/ml, and 50 mg/ml; Syrup - 10 mg/5 ml; and tablets - 10 mg, 25 mg, 50 mg, and 100 mg. Onset is 15 - 30 minutes, Peak level is 2 hours and duration is 4 - 6 hours.

Nursing Considerations: Anticholinergics may cause additive Anticholinergic effects. Use together cautiously.
-CNS (central nervous system) Depressants may increase CNS (central nervous system) depression. Use together cautiously; dosage adjustments may be needed.
-Epinephrine (to treat anaphylaxis and bronchospasm) may inhibit and reverse vasopressor effect of Epinephrine. Avoid using together.
-Alcohol use may increase CNS (central nervous system) depression. Discourage use together.
-May cause false increase in urinary 17 hydroxycorticosteroid level. May cause false negative skin allergen tests by reducing or inhibiting the cutaneous response to histamine.
-Contraindicated in patients hypersensitive to drug.
-Parenteral form is for IM use only, preferably by Z track injection. Never give drug IV or subcutaneously.
-Aspirate IM injection carefully to prevent inadvertent IV injection. Inject deeply into a large muscle.
-If patient takes other CNS (central nervous system) drugs, observe for oversedation. Elderly patients may be more sensitive to adverse anticholinergic effects: monitor these
patients for dizziness, excessive sedation, confusion, hypotension, and syncope.

- Do not confuse Hydroxyzine (Vistaril - antianxiety) with Hydroxyurea (Hydrea - an antineoplastic) or Hydralazine (Apresoline - antihypertensive).
- Warn patient to avoid hazardous activities that require alertness and good coordination until effects of drug are known.
- Tell patient to avoid alcohol while taking drug.
- Advise patient to use sugarless hard candy or gum to relieve dry mouth.
XANAX/ALPRAZOLAM
(Antianxiety)

Indication: Anxiety and Panic Disorders

Action: Unknown: a Benzodiazepine that probably potentiates the effects of GABA (gamma aminobutyric acid), depresses the CNS, (central nervous system) and suppresses the spread of seizure activity

Adverse Reactions: CNS: Insomnia, irritability, dizziness, headache, anxiety, confusion, drowsiness, light headedness, sedation, somnolence, difficulty speaking, impaired coordination, memory impairment, fatigue, depression, suicide, mental impairment, ataxia, paresthesia, dyskinesia, hypoesthesia, lethargy, vertigo, malaise, tremor, nervousness, restlessness, agitation, nightmare, syncope, akathisia, mania
CV: Hot flushes, palpitation, chest pain, hypotension
EENT: Sore throat, allergic rhinitis, blurred vision, nasal congestion
GI: Diarrhea, dry mouth, constipation, nausea, increased or decreased appetite, vomiting, dyspepsia, abdominal pain
GU: Dysmenorrhea, premenstrual syndrome, difficulty urination
Metabolic: Increased or decreased weight
Musculoskeletal: Arthralgia, myalgia, arm or leg pain, back pain, muscle rigidity, muscle cramps, muscle twitch
Respiratory: Upper respiratory tract infection, dyspnea, hyperventilation
Skin: Pruritus, increased sweating, dermatitis
Other: Influenza, injury, emergence of anxiety between doses, dependence

Dosages: Usual first dose, 0.25 to 0.5 mg three times a day. Maximum, 4 mg daily in divided doses. Each indication may have different dosages. Available in oral solution: 1 mg/ml (concentrate); orally disintegrating tablets: 0.25 mg, 0.5 mg, 1 mg, or 2 mg; tablets: 0.25 mg, 0.5 mg, 1 mg, or 2 mg; tablets (extended release): 0.5 mg, 1 mg, 2 mg, or 3 mg. Peak time is 1 - 2 hours.

Nursing Considerations: Anticonvulsants, Antidepressants, Antihistamines, Barbiturates, Benzodiazepines, General Anesthetics, Narcotics, Phenothiazines may increase CNS (central nervous system)
Depressant effects. Avoid using together.

-Aazole Antifungals (including Fluconazole (Diflucan), Itraconazole (Sporanox), Ketoconazole (Nizoral), or Miconazole (Monistat) all antifungals - may increase and prolong Xanax (anxiety) level, CNS (central nervous system) depression, and psychomotor impairment. Avoid using together.

-Carbamazepine (Tegretol - anticonvulsant), Propoxyphene (Darvon - pain) may induce Xanax (anxiety) metabolism and may reduce therapeutic effects. May need to increase dose.

-Cimetadine (Tagamet - stomach), Fluoxetine (Prozac), Fluoxamine (Luvox) both antidepressants, Hormonal Contraceptives, and Nefazodone (Serzone an antidepressant not recommended for children with Batten Disease) may increase Xanax (anxiety) level. Use cautiously together and consider Xanax (anxiety) dosage reduction.

-Tricyclic Antidepressants may increase levels of these drugs. Monitor patient closely.

-Kava, or Valerin root (herbs) may increase sedation. Discourage use together. St. John's Wort (herb) may decrease drug level. Discourage use together.

-Grapefruit juice may increase drug level. Discourage use together.

-Alcohol use may cause additive CNS (central nervous system) effect. Discourage use together.

-Smoking may decrease effectiveness of drug. Monitor patient closely.

-May increase ALT and AST levels.

-Contraindicated in patients hypersensitive to drug or other Benzodiazepines and in those with Acute Angle Closure Glaucoma.

-Use cautiously in patients with hepatic, renal, or pulmonary disease.

-The optimum duration of therapy is unknown.

-Do not withdraw drug abruptly; withdrawal symptoms, including seizures may occur. Abuse or addiction is possible.

-Monitor hepatic, renal, and hematopoietic function periodically in patients receiving repeated or prolonged therapy.

-Do not confuse Alprazolam (Xanax - anxiety) with Alprostadil
(Prostin - vaginal suppository) or Xanax (anxiety) with Zantac (stomach) or Tenex (antihypertensive).
- Warn patient to avoid hazardous activities that require alertness and good coordination until effects of drug are known.
- Tell patient to avoid alcohol while taking drug.
- Advise patient that smoking may decrease drug's effectiveness.
- Warn patient not to stop drug abruptly because withdrawal symptoms or seizures may occur.
- Tell patient to swallow extended release tablets whole.
- Tell patient using orally disintegrating tablets to remove it from bottle using dry hands and to immediately place it on his tongue where it will dissolve and can be swallowed with saliva.
- Tell patient taking half of a scored orally disintegrating tablet to discard the unused half.
- Advise patient to discard the cotton from the bottle of orally disintegrating tablets and keep it tightly sealed to prevent moisture from dissolving the tablets.
ANTIIBIOTICS DRUGS

General guidelines apply to the use of most antiinfective drugs. Antiinfective drugs can be divided into those that are **bacteriostatic**, that is to arrest the multiplication and further development of the infectious agent, or **bacteriocidal**, which is to kill and thus eradicate all living microorganisms. Both lines of administration and length of therapy may be effective by this difference. Some antiinfectives halt the growth of or eradicate many different microorganisms and are termed **broad spectrum** antibiotics. Others affect only certain specific organisms and are **narrow spectrum** antibiotics. Some of the antiinfectives elicit a hypersensitivity reaction in some persons. Penicillin's cause more severe and more frequent hypersensitivity reactions than any other drug. Because of differences in susceptibility of infectious agents to antiinfectives, the sensitivity of the microorganism to the drug ordered should be determined before treatment is initiated. Several sensitivity tests are commonly used for this purpose. Certain antiinfective agents have marked side effects, some of the more serious of which are **neurotoxicity**, **ototoxicity**, and **nephrotoxicity**. Care must be taken not to administer two antiinfectives with similar side effects concomitantly, or to administer these drugs to patients in whom side effects might be damaging (a nephrotoxic drug to a patient suffering from kidney disease). Antiinfective drugs can also eradicate the normal intestinal flora necessary for proper digestion, synthesis of vitamin K and control of fungi that may gain access to the GI (gastrointestinal) tract (superinfection).

**Action/Kinetics**

The mechanism of action of the antiinfectives varies. The following modes of action have been identified.

1. Inhibition of synthesis or activation of enzymes that disrupt bacterial cell walls leading to loss of viability and possibly cell lysis.
2. Direct effect on the microbial cell membrane to affect permeability and leading to leakage of intracellular components.
3. Effect on the function of bacterial ribosomes to cause a reversible inhibition of protein synthesis.
4. Bind to the ribosomal subunit that alters protein synthesis and leads to cell death.
5. Effect on nucleic acid metabolism, which inhibits DNA, dependent RNA.
6. Anti-metabolites that block specific metabolic steps essential to the life of
the microorganism.

7. Bind to vital enzymes that are essential for DNA synthesis leading to a halt of viral replication.

Uses
See individual drugs. The choice of the antiinfectives depends on the nature of the illness to be treated, the sensitivity of the infecting agent, and the patient’s previous experience with the drug. Hypersensitivity and allergic reactions may preclude the use of the agent of choice.

Side Effects
The antibiotics and antiinfective agents have few direct toxic effects. Kidney and liver damage, deafness, and blood dyscrasias are occasionally observed. More frequently seen side effects are as follows:

1. Suppression of the normal flora of the body, which in turn keeps certain pathogenic micro organisms such as Candida albicans, Proteus, or Pseudomonas, from causing infections. If the flora is altered, super infections, (enteritis, UTI’s – urinary tract infection, vaginitis) which necessitate the discontinuation of therapy or the use of other antibiotics, can result.

2. Incomplete eradication of an infectious organism, casual use of anti infectives favors the emergence of restraint strains insensitive to a particular drug.

3. To minimize the chances for the development of restraint strains, anti infectives are usually given at specific doses for a prescribed length of time after acute symptoms has subsided.

Overdose Management
Treatment - discontinues the drug and treats symptomatically. Supportive measures should be instituted as needed. Hemodialysis may be used although its effectiveness is questionable, depending on the drug and the status of the patient (more effective in impaired renal function).

Laboratory Test Consideration
The bacteriologic sensitivity of the infectious organisms to the antiinfective (especially the antibiotic) should be tested by the lab before initiation of therapy and during treatment.
GENERAL NURSING CONSIDERATIONS FOR ALL ANTI-INFECTIVES

Administration/Storage
1. Check expiration date.
2. Store according to recommended storage method.
3. Mark date and time of reconstitution, your initials, and the solution strength. Mark expiration date, store under appropriate conditions.
4. Complete infusion (or as ordered) before the drug loses potency, check drug access.

Assessment
1. Document onset and characteristics of symptoms, location and source of infection (if known).
2. Note any unusual reaction/sensitivity with any antiinfectives (usually penicillin).
3. Obtain cultures before administering empiric therapy.
4. Monitor CBC, renal and liver function tests.

Interventions
1. Conspicuously mark allergy in red on the chart, medication record, ID band, care plan, pharmacy record, and bed. Insert on electronic record - note if observed or reported by patient.
2. Assess for hives, rashes, or difficulty breathing, which may indicate a hypersensitivity or allergic response.
3. Monitor vital signs, intake and output and ensure adequate hydration.
4. If drug mainly excreted by the kidneys, reduce dose with renal dysfunction. Nephrotoxic drugs are usually contraindicated with renal dysfunction because toxic drug levels are rapidly attained.
5. Verify orders when two or more antiinfectives are ordered for the same patient, especially if they have similar side effects such as nephrotoxicity and/or neurotoxicity. Electronic entry prevents confusion.
6. Assess for superinfections, particularly of fungal origin, characterized by black furry tongue, nausea, and/or diarrhea. Prevent super infections by:
7. Limiting exposure to persons suffering from an active infectious process.
8. Rotating IV sites every 72 hours, changing IV tubing every 24 - 48 hours.
10. Washing hands carefully before and after contact with the patient, providing/emphasizing good hygiene, washing hands carefully.
before and after contact with the patient.

11. Schedule administration throughout 24-hour period to maintain therapy drug levels. Administration schedule is determined by the drug halflife, severity of infection, evidence or organ dysfunction, and patient’s need for sleep. Assess drug levels (peak and trough) to determine dosing and to assess adequacy of levels.

**Patient Family Teaching**

1. Take medications at prescribed intervals.
2. Do not share with friends or family members. Prevent reoccurrence by completing entire prescription, despite feeling well. This ensures that the organism is eradicated and diminishes the emergence of drug resistant bacterial strains. Incomplete therapy and indiscriminate use may render patient unresponsive to the antibiotic with the next infection.
3. Report any unusual bleeding or bruising (bleeding gums, blood in stool, urine, or other secretions) signs and symptoms of allergic reactions including rash, fever, itching, hives, or super infections, such as pain, swelling, redness, drainage, perineal itching, diarrhea or a change in signs or symptoms.
4. Discard any unused drug after therapy completed.
5. Take antipyretics as prescribed around the clock for fever reduction as needed.
ANTICONVULSANTS

Therapeutic agents cannot cure convulsive disorders, but do control seizures without impairing the normal functions of the CNS (central nervous system). This is often accomplished by selective depression of hyperactive areas of the brain responsible for the convulsions. Therefore, these drugs are taken at all times (prophylactically) to prevent the occurrence of the seizures. There are several different types of epileptic disorders. No single drug can control all types of epilepsy; thus, accurate diagnosis is important. Drugs effective against one type of epilepsy may not be effective against another. Therapy begins with a small dose of the drug, which is continuously increased until either the seizures disappear or drug toxicity occurs. If a certain drug decreases the frequency of seizures, but does not completely prevent them, another drug can be added to the dosage regimen and administered concomitantly with the first. Failure of therapy most often results from the administration of doses too small to have a therapeutic effect, or from failure to use two or more drugs together. With appropriate diagnosis and selection of drugs, four out of five cases of epilepsy can be controlled adequately, but it may take the provider time to find the best drug or combination of drugs with which to treat the client.

Dosage
Dosage is highly individualized. However, trauma or emotional stress may necessitate an increase in drug dosage requirements (if the patient requires surgery and starts having seizures).

NURSING CONSIDERATIONS
Administration/Storage
Shake oral suspensions thoroughly before pouring to ensure uniform mixing. Drug therapy must be individualized according to patient needs. Do not discontinue abruptly stopping an anticonvulsant unless provider approved. To avoid severe, prolonged convulsions, withdraw over a period of days or weeks. If there is reason to substitute one anticonvulsant for another, withdraw the first drug at the same time the dosage of the second drug is being increased. Be prepared, in case of acute oral toxicity, to assist with inducing emesis (provided the patient is not comatose) and with gastric lavage, along with other supportive measures such as administration of fluids and oxygen.
**Assessment**
Check medical history for hypersensitivity to anticonvulsant drugs. Note derivatives to avoid.
Assess orientation to time and place, affect, reflexes, and vital signs.
Document seizure classification (partial or generalized), frequency/severity of seizures, noting location, duration, consciousness, type, frequency and any precipitating factors, presence of an aura, and any other characteristics. Note: EEG, CT, MRI results.
Assess skin, eyes, and mucous membranes.
Monitor CBC, glucose, uric acid, urinalysis, renal and liver function tests. Determine why the patient is receiving therapy, if no seizures for over 1 year with prophylactic therapy.

**Interventions**
With IV administration, monitor closely for respiratory depression and cardiovascular collapse.
Note any evidence of CNS (central nervous system) side effects, such as blurred vision, dimmed vision, slurred speech, nystagmus, and confusion, supervise ambulation until resolved.
Observe for muscle twitching, loss of muscle tone, episodes of bizarre behavior, and/or subsequent amnesia.
With Phenytoin (Dilantin - anticonvulsant), check calcium levels - contributes to bone demineralization, which can result in osteomalacia in adults and rickets in children - risk increases with inactivity.

**Patient/Family Teaching**
Take drug as prescribed. Do not increase, decrease, or discontinue without approval from your Physician, seizures may result.
May initially cause a decrease in mental alertness, drowsiness, headache, vertigo, and ataxia. CNS (central nervous system) symptoms are dose related and should subside with continued therapy, avoid hazardous tasks until symptoms resolve.
Dosage may require adjusting if undergoing physical trauma or emotional distress.
Vitamin D may be prescribed to prevent hypocalcemia (4,000 units of vitamin D weekly), folic acid may prevent megaloblastic anemia.
Avoid alcohol and any other CNS (central nervous system) Depressants.
Increase fluid intake and include fruit and other foods with roughage and bulk in the diet.
With gingival hyperplasia, intensify oral hygiene, routinely use dental floss, soft toothbrush, massage gums, and obtain dental exams.
If slurred speech develops, try to consciously slow speech patterns to avoid the problem.
Avoid situations/exposures that result in fever and low glucose and sodium levels, may lower seizure threshold.
Report if rash, fever, severe headache, stomatitis, rhinitis, urethritis, balanitis (inflammation of the glans penis) occur, signs and symptoms of hypersensitivity - requires possible change in the drug.
Report sore throat, easy bruising, bleeding, or nosebleeds, which could be signs of hematologic toxicity.
Report jaundice, dark urine, anorexia, and abdominal pain, which may indicate liver toxicity. To detect for hepatitis, hepatocellular necrosis include liver function tests.
Carry ID with the type of seizures and prescribed therapy. Family should learn CPR (cardio pulmonary resuscitation) and how to protect the patient during a seizure.
Identify support groups that may assist to understand and cope with the disorder (Epilepsy Foundation: National Head Injury Group).
CARBATROL/CARBAMAZEPINE
(A long acting Tegretol)
(Anticonvulsant)

Indications: Generalized tonic-clonic and complex partial seizures, mixed seizure patterns; acute mania and mixed episodes associated with Bipolar I Disorder; Trigeminal Neuralgia; Restless Legs Syndrome; Nonneuritic Pain Syndromes (pain neuromas, phantom limb pain)

Action: Thought to stabilize neuronal membranes and limit seizure activity by either increasing efflux or decreasing influx of sodium ions across cell membranes in the motor cortex during generation of nerve impulses

Adverse Reactions: CNS: Ataxia, dizziness, drowsiness, vertigo, worsening of seizures, confusion, fatigue, fever, headache, syncope
Cardiovascular: Arrhythmias, AV block, congestive heart failure, hypertension, hypotension, coronary artery disease
Respiratory: Pulmonary hypersensitivity
EENT: Blurred vision, diplopia, nystagmus, conjunctivitis, dry pharynx
GI: Nausea, vomiting, abdominal pain, diarrhea, anorexia, dryness of mouth, glossitis, stomatitis
GU: Urinary frequency, acute urinary retention, glycosuria, albuminuria
Hematologic: Agranulocytosis, aplastic anemia, thrombocytopenia, eosinophilia, leukocytosis
Hepatic: Hepatitis
Metabolic: Hyponatremia, SIADH (Syndrome of Inappropriate Antidiuretic Hormone)
Skin: Rash, Steven Johnson Syndrome, erythema multiforme, excessive sweating, urticaria
Other: Chills

Dosages: Children younger than 6: 10 mg/kg to 20 mg/kg in two to three divided doses (tablets) or four divided doses (suspension). Maximum dosage is 35 mg/kg in 24 hours.
For children 6 to 12: initially, 100 mg oral twice a day (tablets or extended release tablets) or 50 mg suspension oral four times a day with meals, increased at weekly intervals by up to 100 mg
orally divided in three or four doses daily (divided twice a day for extended release form). Maximum, 1000 mg daily. Usual maintenance is 400 mg to 800 mg daily; or 20 mg/kg to 30 mg/kg in divided doses three or four times daily. Children older than 12 and adults: initially 200 mg oral twice a day (tablets or extended release tablets), or 100 mg four times a day of suspension with meals. May be increased weekly by 200 mg orally daily in divided doses at 12 hour intervals for extended release tablets or six to eight hours intervals for tablets or suspension, adjusted to minimum effective level. Maximum, 1000 mg daily in children ages 12 to 15 and 1200 mg daily in children older than 15. Usual maintenance dosage is 800 mg to 1200 mg daily. Therapeutic blood level 4 - 12. Available forms are: capsules 100 mg, 200 mg, and 300 mg; oral suspension 100 mg/5 ml; tablets 200 mg; tablets (chewable) 100 mg and 200 mg; tablets (extended release) 100 mg, 200 mg, 300 mg and 400 mg. The peak time for oral route is 1½ to 12 hours and the peak time for the extended release tablets is 4 to 8 hours.

Nursing Consideration: Atracurium, Cisatracurium, Pancuronium, Rocuronium, Vecuronium (all neuromuscular blocking agents) may decrease the effects of nondepolarizing muscle relaxant, causing it to be less effective. May need to increase the dose of the nondepolarizing muscle relaxant.

-Cimetadine (Tagamet - stomach), Danazol (Danocrine – sex hormone), Diltiazem (Cardiazem - heart), Fluoxetine (Prozac), Fluvoxamine (Luvox) - both antidepressant, Isoniazid (antitubucular), Macrolides (class of antibiotics), Propoxyphene (Darvon - pain), Valproic Acid (Depakote - anticonvulsant), Verapamil (Calan - heart) may increase Carbamazepine level (Tegretol - anticonvulsant). Use together cautiously.

-Clarithromycin, Erythromycin, Troleandomycin (all antiinfectives) may inhibit metabolism of Carbamazepine (Tegretol - anticonvulsant), increasing Carbamazepine (Tegretol - anticonvulsant) level and risk of toxicity. Avoid using together.

-Doxycycline (Vibramycin - antiinfective), Felbamate (Felbatol - anticonvulsant), Haloperidol (Haldol - antipsychotic), Hormonal Contraceptives, Phenytoin (Dilantin - anticonvulsant), Theophylline - bronchodilator), Tiagabine (Gabatril), Topiramate
(Topamax - anticonvulsant), Valproate (Depakote - anticonvulsant), Warfarin (Coumadin - blood thinner) may decrease levels of these drugs. Watch for decreased effects.

-Lamotrigine (Lamictal - anticonvulsant) may decrease Lamotrigine (Lamictal - anticonvulsant) level and increase Carbamazepine (Tegretol - anticonvulsant) level. Monitor patient for clinical effects and toxicity.

-Lithium (antipsychotic) may increase CNS (central nervous system) toxicity of Lithium (antipsychotic). Avoid using together.

-MAO (Monoamine Oxidase) Inhibitors may increase depressant and anticholinergic effects. Avoid using together.

-Phenobarbital (Luminal), Phenytoin (Dilantin), Primidone (Mysoline) all anticonvulsants, may decrease Carbamazepine level. Watch for decreased effect.

-Nefazodone (Serzone - antidepressant, not recommended for children with Batten Disease) may increase Carbamazepine (Tegretol - anticonvulsant) levels and toxicity while reducing Nefazodone (Serzone - antidepressant) levels and therapeutic benefits. Use together is contraindicated.

-Plantains (psyllium seed - laxative): may inhibit GI (gastrointestinal) absorption of drug. Discourage use together.

-May increase BUN level. May decrease Hemoglobin level and hematocrit.

-May increase liver function test values and eosinophil and WBC counts. May decrease thyroid function test values and granulocyte and platelet counts.

-contraindicated in patients hypersensitive to this drug or Tricyclic Antidepressants and in those with a history of bone marrow suppression; also contraindicated in those who have taken an MAO (Monoamine Oxidase) Inhibitor within 14 days.

-Use cautiously in patients with mixed Seizure Disorders because they may experience an increased risk of seizures. Also, use with caution in patients with hepatic dysfunction.

-Watch for worsening of seizures, especially in patients with mixed seizure disorders, including atypical absence seizures.

-Obtain baseline determinations of urinalysis, BUN and iron levels, liver function, CBC, and platelet and reticulocyte counts.
Monitor these values periodically and thereafter.
- Shake oral suspension well before measuring dose.
- Contents of extended release capsules may be sprinkled over applesauce if patient has difficulty swallowing capsules.
Capsules and tablets should not be crushed or chewed, unless labeled as chewable form.
- When giving by nasogastric tube, mix dose with an equal volume of water, normal saline solution, or D5W. Flush tube with 100 ml of diluent after giving dose.
- Never stop drug suddenly when treating seizures. Notify Physician immediately if adverse reactions occur.
- Adverse reactions may be minimized by gradually increasing dosage.
- Therapeutic level is 4 to 12 mcg/ml. Monitor level and effects closely. Ask patient when last dose was taken to better evaluate drug level.
- When managing seizures, take appropriate precautions.
- Watch for signs of anorexia or subtle appetite changes, which may indicate excessive drug level.
- Do not confuse Tegretol - anticonvulsant or Tegretol XR (anticonvulsant) with Topamax (anticonvulsant), Toprol XL (heart), or Toradol (antiinflammatory). Do not confuse Carbatrol (anticonvulsant) with Carvedilol (Coreg - heart).
- Instruct patient to take drug with food to minimize GI (gastrointestinal) distress. Tell patient taking suspension form to shake container well before measuring dose.
- Tell patient not to chew or crush extended release form and not to take broken or chipped tablets.
- Tell patient that Tegretol XR (anticonvulsant) tablet coating may appear in stool because it has not been absorbed.
- Advise patient to keep tablets in the original container and to keep the container tightly closed and away from moisture. Some formulations may harden when exposed to excessive moisture, so that less is available in the body, decreasing seizure control.
- Inform patient that when drug is used for Trigeminal Neuralgia, an attempt to decrease dosage or withdraw drug is usually made every 3 months.
- Advise patient to notify Physician immediately if fever, sore
throat, mouth ulcers, or easy bruising or bleeding occurs.
-Tell patient that drug may cause mild to moderate dizziness and
drowsiness when first taken. Advise him to avoid hazardous
activities until effects disappear, usually within three or four
days.
-Advise patient that periodic eye examinations are
recommended.
DEPAKENE/DEPAKOTE, VALPROIC ACID, EPILIMUM
(Anticonvulsant)

Indication: Simple and complex absence seizures, mixed seizure types (including absence seizures, complex partial seizures, mania, to prevent migraine headaches

Action: Unknown. Probably facilitates the effects of the inhibitory neurotransmitter GABA (gamma aminobutyric acid)

Adverse Reactions: In children with Batten Disease can see hair loss, because the drug is used in combination with other anticonvulsants, reactions may not be caused from Valproic acid alone
CNS: Asthenia, dizziness, headache, insomnia, nervousness, somnolence, tremor, abnormal thinking, amnesia, ataxia, emotional upset, depression, fever
CV: Chest pain, edema, hypertension, hypotension, tachycardia
Respiratory: Bronchitis, dyspnea
EENT: Blurred vision, diplopia, nystagmus, pharyngitis, rhinitis, tinnitus
GI: Abdominal pain, anorexia, diarrhea, dyspepsia, nausea, vomiting, pancreatitis, constipation, increased appetite
Hematologic: Decrease in carnitine levels which may cause spontaneous myoclonus, bone marrow suppression, hemorrhage, thrombocytopenia, bruising, petechiae
Hepatic: Hepatotoxicity
Metabolic: Hyperammonemia, weight loss or gain
Musculoskeletal: Back and neck pain
Skin: Alopecia, flu syndrome, infection, erythema multiforme, Stevens Johnson Syndrome, rash, photosensitivity, pruritus

Dosages: Initially, 15 mg/kg orally or IV daily; then increase by 5 mg/kg to 10 mg/kg daily at weekly intervals up to 60 mg/kg/day. Do not use Depakote ER in children younger than age 10. Each dosage may vary with indication. Available forms are: capsules 250 mg; syrup 200 mg/5 ml; tablets (crushable) 100 mg; tablets (enteric coated) 200 mg and 500 mg; capsules (sprinkles) 125 mg; tablets (delayed release) 125 mg, 250 mg and 500 mg; tablets (extended release) 250 mg and 500 mg. The oral peak time is 15 minutes to 4 hours.

Nursing Considerations: Aspirin, Chlorpromazine (Thorazine - antipsychotic),
Cimetadine (Tagamet - stomach), Erythromycin (antibiotic), Felbamate (Felbatol - anticonvulsant) may cause Depakote (anticonvulsant) toxicity. Use together cautiously and monitor drug level.

-Benzodiazepines, other CNS (central nervous system) Depressants may cause excessive CNS (central nervous system) depression. Avoid using together.

-Carbamazepine (Tegretol - anticonvulsant) may cause Carbamazepine (Tegretol - anticonvulsant) CNS (central nervous system) toxicity; may decrease Depakote (anticonvulsant) level and cause loss of seizure control. Use together cautiously, if at all. Monitor patient for seizure activity and toxicity during therapy and for at least 1 month after stopping either drug.

-Lamotrigine (Lamictal - anticonvulsant) may increase Lamictal (anticonvulsant) level; may decrease Depakote (anticonvulsant) level. Monitor levels closely.

-Phenobarbital (anticonvulsant) may increase Phenobarbital (anticonvulsant/sedative) level; may increase clearance of Depakote (anticonvulsant). Monitor patient closely.

-Phenytoin (Dilantin - anticonvulsant) may increase or decrease Dilantin (anticonvulsant) level; may decrease Depakote (anticonvulsant) level. Monitor patient closely.

-Rifampin (antitubercular) may decrease Depakote (anticonvulsant) level. Monitor level of Depakote (anticonvulsant).

-Warfarin (Coumadin – blood thinner) may displace Warfarin (Coumadin – blood thinner) from binding sites. Monitor PT and INR.

-Zidovudine (antiviral) may decrease Zidovudine (antiviral) clearance. Avoid using together.

-May increase ammonia, ALT, AST, and bilirubin levels.

-May increase eosinophil count and bleeding time. May decrease platelet, RBC, and WBC counts.

-May cause false positive results for urine ketone levels.

-Contraindicated in patients hypersensitive to drug and in those with hepatic disease or significant hepatic dysfunction, and in patients with a urea cycle disorder (UCD).

-Safety and efficacy of Depakote ER (anticonvulsant) in children
younger than age 10 has not been established.
- Obtain liver function test results, platelet count, and PT and INR before starting therapy, and monitor these values periodically.
- Do not give syrup to patients who need sodium restriction. Check with Physician.
- Adverse reactions may not be caused by Depakote (anticonvulsant) alone because it is usually used with other anticonvulsants.
- When converting adults and children age 10 and older with seizures from Depakote to Depakote ER, (both anticonvulsants) make sure the extended release dose is 8% to 20% higher than the regular dose taken previously. See manufacturer’s package insert for more details.
- Depakote (anticonvulsant) has a lower risk of adverse GI (gastrointestinal) reactions.
- Never withdraw drug suddenly because sudden withdrawal may worsen seizures. Call Physicians at once if adverse reactions develop.
- Fatal hepatotoxicity may follow nonspecific symptoms, such as malaise, fever, and lethargy. If these symptoms occur during therapy, notify Physician at once because patient who might be developing hepatic dysfunction must stop taking drug.
- Patients at high risk for hepatotoxicity include those with Congenital Metabolic Disorders, Mental Retardation, or Organic Brain Disease; those taking multiple Anticonvulsants; and children younger than age 2.
- Notify Physician if tremors occur; a dosage reduction may be needed.
- Monitor drug level. Therapeutic level is 50 mcg/ml to 100 mcg/ml.
- When converting patients from a brand name drug to a generic drug, use caution because breakthrough seizures may occur.
- Sometimes fatal, hyperammonemic encephalopathy may occur when starting Depakote (anticonvulsant) therapy in patients with a UCD (urea cycle disorder). Evaluate patients with UCD (urea cycle disorder) risk factors before starting Depakote (anticonvulsant) therapy.
Patients who develop symptoms of unexplained hyperammonemic encephalopathy during Depakote (anticonvulsant) therapy should stop drug, undergo prompt appropriate treatment, and be evaluated for underlying UCD (urea cycle disorder).
- Do not confuse Depakote with Depakote ER (both anticonvulsants).
- Tell patient to take drug with food or milk to reduce adverse GI (gastrointestinal) effects.
- Advise patient not to chew capsules; irritation of mouth and throat may result.
- Tell patient that capsules may be either swallowed whole or carefully opened and contents sprinkled on a teaspoonful of soft food. Tell patient to swallow immediately without chewing.
- Tell patient and parents that syrup should not be mixed with carbonated beverages; mixture may be irritating to mouth and throat.
- Tell patient and parents to keep drug out of children’s reach.
- Warn patient and parents not to stop drug therapy abruptly.
- Advise patient to avoid driving and other potentially hazardous activities that require mental alertness until drug’s CNS (central nervous system) effects are known.
- Instruct patient or parents to call Physician if malaise, weakness, lethargy, facial swelling, loss of appetite, or vomiting occurs.
**DILANTIN/PHENYTOIN**  
(*Anticonvulsant*)

**Indication:** Generalized tonic clonic (grand mal) seizures and complex partial (temporal lobe) seizures; for patient requiring a loading dose; to prevent and treat seizures occurring during neurosurgery; status epilepticus

**Action:** May stabilize neuronal membranes, limits seizure activity by either increasing efflux or decreasing influx of sodium ions across cell membranes in the motor cortex during generation of nerve impulses

**Adverse Reactions:** Children with Batten Disease, especially girls, can grow mustaches; gums reddened and overgrown teeth.  
CNS: Ataxia, decreased coordination, mental confusion, slurred speech, confusion, dizziness, insomnia, nervousness, twitching, headache  
Cardiovascular: Periarteritis nodosa  
EENT: Nystagmus, diplopia, blurred vision  
GI: Nausea, vomiting, gingival hyperplasia, constipation  
Hematologic: Agranulocytosis, leukopenia, pancytopenia, thrombocytopenia, macrocythemia, megaloblastic anemia  
Hepatic: Toxic hepatitis  
Metabolic: Hyperglycemic  
Musculoskeletal: Osteomalacia  
Skin: Steven Johnson Syndrome, lupus, toxic epidermal necrosis, bullous or purpuric dermatitis, discoloration of skin if given by IV push in back of hand, exfoliative dermatitis, hypertrichosis, inflammation at injection site, lupus erythematosus, necrosis, pain, photosensitivity reactions, scarlatiniform or morbilliform rash  
Other: Hirsutism, lymphadenopathy

**Dosages:** 5 mg/kg/every day, usual dose range is 4 mg/kg to 8 mg/kg daily. Maximum daily dose is 300 mg for children. For adults dosage is highly individualized. Initially, 100 mg orally three times a day, increasing by 100 mg orally every 2 to 4 weeks until desired response is obtained. Usual range is 300 mg to 600 mg daily. If patient is stabilized with extended release capsules, once daily dosing with 300 mg extended release capsules is
possible as an alternative. Available forms are: oral suspension 125 mg/5ml; tablets (chewable); capsules (extended) 30 mg, 100 mg, 200 mg and 300 mg; capsules 100 mg; injection 50mg/ml. The peak time for regular Dilantin is 1½ to 12 hours; the peak for the extended oral is 4 to 12 hours; and the peak for the IV route is 1 – 2 hours.

Nursing Considerations: Acetaminophen may decrease the therapeutic effects of Acetaminophen and increase the incidence the hepatotoxicity. Monitor for toxicity.

- Amiodarone (heart), Antihistamines, Chloramphenicol (antiinfective), Cimetadine (Tagamet - stomach), Cyclosporine - (immunosuppressant), Diazepam (Valium - anticonvulsant/anxiety), Fluconazole (Diflucan - antifungal), Isoniazid (antitubercular), Metronidazole (Flagyl - antiinfective), Omeprazole (Prilosec - antiulcer), Phenylbutazone (anti-inflammatory), Salicylates (like Aspirin), Sulfonamides (Sulfa drugs), Ticlodipine (Ticlid - antiplatelet), Valproate - (Depakote - anticonvulsant) may increase Dilantin (anticonvulsant) activity and toxicity. Monitor patient for toxicity and adjust dose as needed.

- Atracurium, Cistracurium, Pancuronium, Rocuronium, Vecuronium (all blocking agents), may decrease the effects of nondepolarizing muscle relaxant. May need to increase the nondepolarizing muscle relaxant dose.

- Barbiturates, Carbamazepine (Tegretol - anticonvulsant), Dexamethasone (Decadron - antiinflammatory), Diazoxide (Hyperstat - antihypertensive), Folic Acid (Vitamin), Rifampin (antitubercular) may decrease Dilantin (anticonvulsant) activity. Monitor Dilantin (anticonvulsant) activity.

- Carbamazepine (Tegretol - anticonvulsant), Cardiac Glycosides, Doxycycline (Vibramycin - antiinfective), Hormonal Contraceptives, Quinidine (heart), Theophyline (bronchodilator), Valproic Acid (Depakote - anticonvulsant), may decrease effects of these drugs. Monitor patient.

- Cyclosporine (immuno suppressant) may decrease Cyclosporine (immunosuppressant) levels, risking organ rejection. Monitor Cyclosporine (immunosuppressant) levels closely and adjust dose as needed.
- Disulfram (Antabuse - management of alcohol abuse) may increase toxic effects of Dilantin (anticonvulsant). Monitor Dilantin (anticonvulsant) level closely and adjust dosage as needed.
- Lithium (antipsychotic) may increase toxicity of Lithium (antipsychotic) despite normal Lithium (antipsychotic) blood levels. Monitor patient for adverse effects.
- Warfarin (Coumadin - blood thinner) may increase effects of Warfarin (Coumadin - blood thinner). Monitor patient for bleeding.
- Enteral tube feeding may interfere with absorption of oral drug. Stop enteral feedings for 2 hours before and 2 hours after drug use.
- Long term alcohol use may decrease drug's activity. Strongly discourage patient from heavy alcohol use.
- May increase alkaline phosphatase, GGT, and glucose levels. May decrease urinary 17 hydroxysteroid, 17 ketosteroid, and hemoglobin levels and hematocrit.
- May increase urine 6-hydroxycortisol excretion. May decrease Dexamethasone (steroid) suppression, Metyrapone (a drug to diagnose adrenal insufficiency) test results, and platelet, WBC, RBC, and granulocyte counts.
- May falsely reduce protein-bound iodine or free thyroxine level test results.
- Contraindicated in patients hypersensitive to Hydantoin (a colorless base derived from urea) and in those with sinus bradycardia, SA block, second or third degree AV block, or Stoke Adams Syndrome.
- Use cautiously in patients with hepatic dysfunction, hypotension, myocardial insufficiency, diabetes, or respiratory depression; in elderly or debilitated patients; and in those receiving other Hydantoin (a colorless base derived from urea) derivatives.
- Elderly patients tend to metabolize drug slowly and may need reduced dosages.
- Do not give IM (intramuscular) route unless dosage adjustments are made; drug may precipitate at injection site; cause pain, and be absorbed erratically.
-Divided doses given with or after meals may decrease adverse GI (gastrointestinal) reactions.
-If rash appears, stop drug. If rash is scarlatiniform or morbilliform, resume drug after rash clears. If rash reoccurs, stop therapy. If rash is exfoliative, purpuric, or bullous, do not resume drug.
-Do not stop drug suddenly because this may worsen seizures. Call Physician immediately if adverse reactions develop.
-Monitor drug level. Therapeutic level is 10 to 20 mcg/ml.
-Allow at least 7 to 10 days to elapse between dosage changes.
-Monitor CBC and calcium level every 6 months, and periodically monitor hepatic function. If megaloblastic anemia is evident, Physician may order folic acid and vitamin B12.
-If using to treat seizures, take appropriate safety precautions.
-Mononucleosis may decrease level. Watch for increased seizures.
-Watch for gingival hyperplasia, especially in children.
-Doubling the dose does not double the level but may cause toxicity. Consult Pharmacist for specific dosing recommendations.
-If seizure control is established with divided doses, once daily dosing may be considered.
-Do not confuse Phenytoin (Dilantin - anticonvulsant) with Mephenytoin (anticonvulsant) or Fosphenytoin (Cerebyx - anticonvulsant) or Dilantin (anticonvulsant) with Dilaudid (narcotic for pain).
-Tell patient to notify Physician if skin rash develops.
-Advise patient to avoid driving and other potentially hazardous activities that require mental alertness until drug’s CNS (central nervous system) effects are known.
-Advise patient not to change brands or dosage forms once he is stabilized on therapy.
-Dilantin (anticonvulsant) capsules are the only oral form that can be given once daily. Toxic levels may result if any other brand or form is given once daily. Dilantin (anticonvulsant) tablets and oral suspension should never be given once daily.
-Tell patient not to use capsules that are discolored.
-Advise patient to avoid alcohol.
- Warn patients and parents not to stop drug abruptly.
- Stress importance of good oral hygiene and regular dental examinations. Surgical removal of excess gum tissue may be needed periodically if dental hygiene is poor.
- Caution patient that drug may color urine pink, red, or reddish brown.
**GABITRIL/TIAGABINE**

*(Anticonvulsant)*

**Indications:** Treatment of partial seizures

**Action:** Unknown. May act by facilitating the effects of the inhibitory neurotransmitter GABA (gamma aminobutyric acid). By binding to recognition sites linked to GABA uptake carrier, drug may make more GABA (gamma aminobutyric acid) available

**Adverse Reactions:**
- **CNS:** Dizziness, asthenia, nervousness, somnolence, abnormal gait, agitation, ataxia, confusion, depression, difficulty with concentration and attention, difficulty with memory, emotional lability, hostility, insomnia, language problems, paresthesia, speech disorder, tremor
- **Cardiovascular:** Vasodilatation
- **Respiratory:** Increased cough
- **EENT:** Pharyngitis, nystagmus
- **GI:** Nausea, abdominal pain, vomiting, diarrhea, increased appetite, mouth ulceration
- **Musculoskeletal:** Generalized weakness
- **Skin:** Serious skin rash, pruritus

**Dosages:**
- **Children ages 12 - 18** start at 4 mg once daily. Total daily dose may be increased thereafter by 4 mg at beginning of 2nd week and thereafter by 4 mg to 8 mg per week until clinical response or up to 32 mg daily. Give daily dose in divided doses two to four times per day. **Adults,** start at 4 mg orally once daily. Total daily dose may be increased by 4 to 8 mg at weekly intervals until clinical response or up to 56 mg daily. Give total daily dose in divided doses two to four times daily. Available forms are: tablets in 4 mg, 12 mg, and 16 mg. The peak time is 45 minutes and the duration is 7 - 9 hours.

**Nursing Considerations:** Carbamazepine (Tegretol), Phenobarbital, Phenytoin (Dilantin) all anticonvulsants, may increase Gabitril (anticonvulsant) clearance. Monitor patient closely.

- CNS (central nervous system) Depressants may enhance CNS (central nervous system) effects. Use together cautiously.
- Alcohol use may enhance CNS (central nervous system) effects. Discourage use together.
- Contraindicated in patients hypersensitive to drug or its components.
- Drug may cause new-onset seizures and status epilepticus in patients without a history of epilepsy. In these patients, stop drug and evaluate for underlying seizure disorder. Drug should not be used for off label uses.
- Withdraw drug gradually unless safety concerns require a more rapid withdrawal because sudden withdrawal may cause more frequent seizures.
- Use of Anticonvulsants, including Gabitril (anticonvulsant), may cause status epilepticus and sudden unexpected death in patients with epilepsy.
- Do not confuse Tiagabine (Gabitril - anticonvulsant) with Tizanidine (Zanaflex – antispasmodic); both have 4 mg starting doses.
- Patients who are not receiving at least one enzyme - inducing anticonvulsant when starting Gabitril (anticonvulsant) may need lower doses or slower dosage adjustment.
- Drug may cause moderately severe to incapacitating generalized weakness, which resolves after dosage is reduced or drug stopped.
- Advise patient to take drug only as prescribed.
- Tell patient to take drug with food.
- Warn patient that drug may cause dizziness, somnolence, and other signs and symptoms of CNS (central nervous system) depression. Advise patient to avoid driving and other potential hazardous activities that require mental alertness until drug's CNS (central nervous system) effects are known.
KEPPRA/LEVEITIRACETAM
(Anticonvulsant)

Indications: Adjunct for myoclonic seizures of juvenile myoclonic epilepsy and adjunct for partial onset seizures in patients with epilepsy

Action: May act by inhibiting simultaneous neuronal firing that leads to seizure activity

Adverse Reactions: CNS: Asthenia, headache, somnolence, amnesia, anxiety, ataxia, depression, dizziness, emotional lability, hostility, nervousness, paresthesia, vertigo
Respiratory: Cough, infection
EENT: Diplopia, rhinitis, pharyngitis, sinusitis
GI: Anorexia
Hematologic: Leukopenia, neutropenia
Musculoskeletal: Pain

Dosages: For children 4 to 16 initially start with 10 mg/kg orally twice a day. Increase dose by 10mg/kg twice a day at 2 week intervals to recommended dose of 30 mg/kg twice a day. If patient can not tolerate this dose, reduce it. For children who weigh 20 kg (44 lb) or less, use the oral solution. For children older than 16 and adults, initially start with 500 mg orally or IV twice a day. Increase dosage by 500 mg as needed for seizure control at 2 - week intervals to maximum of 1500 mg twice a day. Available forms are: injection 500 mg/5ml single use vial; oral solution 100 mg/ml; tablets 250 mg, 500 mg, and 750 mg. The oral and IV route both have an onset of 1 hour with a peak of 1 hour and a duration of 12 hours.

Nursing Considerations: Antihistamines, Benzodiazepines, Opioids, other drugs that cause drowsiness, Tricyclic Antidepressants may lead to severe sedation. Avoid using together.
-Alcohol use may lead to severe sedation. Discourage use together.
-May decrease hemoglobin level and hematocrit.
-May decrease WBC, RBC, and neutrophil counts. May alter liver function test results.
-Contraindicated in patients hypersensitive to drug.
-Leukopenia and neutropenia have been reported with drug use. Use cautiously in immunocompromised patients, such as those
with cancer, or HIV infection.
- Patients with poor renal function need dosage adjustment.
- Drug can be taken with or without food.
- Oral and IV forms are bioequivalent.
- Use drug only with other Anticonvulsants; it is not recommended for monotherapy.
- Seizures can occur if drug is stopped abruptly. Tapering is recommended.
- Monitor patients closely for such adverse reactions as dizziness, which may lead to falls.
- Do not confuse Keppra (anticonvulsant) with Kaletra (Ritonavir - antiretroviral).
- Warn patient to use extra care when sitting up or standing up to avoid falling.
- Advise patient to call Physician if adverse reactions occur and not to stop drug suddenly.
- Tell patient to take with other prescribed seizure drugs.
- For the oral solution, tell patient or parent to use a calibrated measuring device, not a household spoon.
- Warn patient that drug may cause dizziness and somnolence and that he should avoid driving, bike riding, or other hazardous activities until he knows how the drug will affect him.
- Inform patient that drug can be taken with or without food.
KLONOPIN/CLONAZEPAM
(Anticonvulsant)

Indications: Lennox Gestaut Syndrome and atypical absence seizures, akinetic and myoclonic seizures, may be useful in absence (petit mal) seizures, seizures that have not responded to other Anticonvulsants, may also be useful in Bipolar Disorders and involuntary leg movement during sleep, adjunct treatment for schizophrenia, Parkinsonian (hypokinetic) dysarthria, multifocal tic disorders, neuralgias.

Action: Unknown. Probably acts by facilitating the effects of the inhibitory neurotransmitter gamma aminobutyric acid (GABA).

Adverse Reactions: CNS: Drowsiness, agitation, ataxia, behavioral disturbances, confusion, depression, slurred speech, tremors.
Cardiovascular: Palpitations.
Respiratory: Respiratory depression, chest congestion, shortness of breath.
EENT: Nystagmus, abnormal eye movements.
GI: Constipation, gastritis, change in appetite, nausea, diarrhea, anorexia, vomiting, sore gums.
GU: Dysuria, enuresis, nocturia, urinary retention.
Hematologic: Leukopenia, thrombocytopenia, eosinophilia.
Skin: Rash.

Dosages: Children up to age 10 or 30 kg orally daily (not to exceed 0.05 mg/kg daily) in two or three divided doses. Increase by 0.25 mg to 0.5 mg every third day to maximum maintenance dose of 0.1 mg/kg to 0.2 mg/kg daily, as needed. Adults initially, no more than 1.5 mg orally daily in three divided doses. May be increased by 0.5 mg to 1 mg every 3 days until seizures are controlled. If given in unequal doses, give largest dose at bedtime. Maximum recommended daily dose is 20 mg.
Therapeutic blood level 20 - 80. Available form is tablets in 0.5 mg, 1 mg, and 2 mg. The peak time is 1 - 2 hours.

Nursing Considerations: Carbamazepine (Tegretol), Phenobarbitol, Phenytoin (Dilantin) all anticonvulsants, may lower Klonopin (anticonvulsant) level. Monitor patient closely.
-CNS (central nervous system) Depressants may increase CNS (central nervous system) depression. Avoid using together.
- Fluconazole (Diflucan), Itraconazole (Sporanox), Ketoconazole (Nizoral), Miconazole (Monistat), all antifungals, may increase and prolong drug levels, CNS depression, and psychomotor impairment. Avoid using together.
- Alcohol use may cause additive CNS (central nervous system) effects. Discourage use together.
- Smoking may increase clearance of Klonopin (anticonvulsant). Monitor patient for decreased drug effects.
- May increase liver function test values and eosinophil counts. May decrease platelet and WBC counts.
- Contraindicated in patients hypersensitive to Benzodiazepines and in those with significant Hepatic Disease or Acute Angle Closure Glaucoma.
- Use cautiously in patients with mixed type seizures because drug may cause generalized tonic clonic seizures.
- Use cautiously in children and in patients with Chronic Respiratory Disease or Open Angle Glaucoma.
- Watch for behavioral disturbances, especially in children.
- Do not stop drug abruptly because this may worsen seizures. Call Physician at once if adverse reactions develop.
- Assess elderly patient's response closely. Elderly patients are more sensitive to drug's CNS (central nervous system) effects.
- Monitor patient for oversedation.
- Monitor CBC and liver function tests.
- Withdrawal symptoms are similar to those of Barbiturates.
- To reduce inconvenience of somnolence when drug is used for panic disorder, giving one dose at bedtime may be desirable.
- Advise patient to avoid driving and other hazardous activities that require mental alertness until drug's CNS (central nervous system) effects are known.
- Instruct parent to monitor child's school performance because drug may interfere with attentiveness.
- Warn patient and parents not to stop drug abruptly because seizures may occur.
LAMICTAL/LAMOTRIGINE
(Anticonvulsant)

Indications: Adjunct treatment of partial seizures caused by epilepsy, or generalized seizures of Lennox Gastaut Syndrome; to convert patients from therapy with a hepatic enzyme-inducing anticonvulsant alone to Lamotrigine therapy; to convert patients with partial seizures from adjunctive therapy with Valproate to therapy with Lamotrigine alone; Bipolar Disorder; adjunctive therapy for primary generalized tonic clonic seizures

Action: Unknown. May inhibit release of glutamate and aspartate (excitatory neurotransmitters) in the brain via an action at voltage-sensitive sodium channels

Adverse Reactions: CNS: Headache, dizziness, ataxia, somnolence, children with Batten Disease can have shaky tremors and extrapyramidal features, seizures, aggravated reaction, anxiety, decreased memory, depression, dysarthria, emotional lability, fever, incoordination, insomnia, irritability, malaise, mind racing, speech disorder, sleep disorder, tremor, vertigo
Respiratory: Increased cough, dyspnea
EENT: Rhinitis, blurred vision, pharyngitis, diplopia, nystagmus, vision abnormality
GI: Nausea, vomiting, diarrhea, dyspepsia, constipation, anorexia, dry mouth, abdominal pain
GU: Dysmenorrhea, vaginitis, amenorrhea
Musculoskeletal: Muscle spasm, neck pain
Skin: Rash, Stevens Johnson Syndrome, toxic epidermal necrolysis, acne, alopecia, hot flashes, pruritus
Other: Infection, chills, flu like symptoms, tooth disorder

Dosages: Children ages 2 to 12 weighing 6.7 to 40 kg (15 – 88 lb), initially 0.6 mg/kg orally daily in two divided doses (rounded down to nearest whole tablet) for 2 weeks; then 1.2 mg/kg daily in two divided doses for another 2 weeks. Usual maintenance dosage is 5 to 15 mg/kg orally daily (maximum 400 mg daily in two divided doses. Children older than 12 and adults start at 50 mg orally daily for 2 weeks; then 100 mg orally daily in two divided doses for two weeks. Increase as needed by 100 mg
daily every 1 to 2 weeks. Usual maintenance dosage is 300 - 500 mg orally daily in two divided doses. Available forms are: tablets 25 mg, 100 mg, 150 mg, and 200 mg; tablets (chewable dispersible) 2 mg, 5 mg and 25 mg. The peak time is 1 - 5 hours.

Nursing Considerations: Acetaminophen (Tylenol) may decrease therapeutic effects of Lamictal (anticonvulsant). Monitor patient.
-Carbamazepine (Tegretol - anticonvulsant) may decrease effects of Lamictal (anticonvulsant) while increasing toxicity of Carbamazepine (Tegretol – anticonvulsant). Adjust doses and monitor patient.
-Ethosuximide (Zarontin), Oxcarbazepine (Trileptal), Phenobarbital (Luminal), Phenytoin (Dilantin), Primidone (Mysoline) all anticonvulsants, may decrease Lamictal (anticonvulsant) level. Monitor patient closely.
-Folate inhibitors, such as Co-Trimoxazole (Bactrim - UTI/urinary tract infection) and Methotrexate (antineoplastic) may have additive effects because Lamictal (anticonvulsant) inhibits dihydrofolate reductase, an enzyme involved in folic acid synthesis. Monitor patient.
-Oral Contraceptives containing Estrogen (hormone), Rifampin (antitubercular) may decrease Lamictal (anticonvulsant) levels. Adjust dose. By the end of the “pillfree” week, Lamictal (anticonvulsant) levels may double.
-Valproic Acid (Depakote - anticonvulsant) may decrease clearance of Lamictal (anticonvulsant), which increases Lamictal (anticonvulsant) level; also decreases Valproic Acid (Depakote - anticonvulsant) level. Monitor patient for toxicity.
-Sun exposure may cause photosensitivity reactions. Advise patient to avoid excessive sun exposure.
-Contraindicated in patient hypersensitive to drug or its components.
-Use cautiously in patients with renal, hepatic, or cardiac impairment.
-Do not stop abruptly because this may increase seizure frequency. Instead, taper drug over at least 2 weeks.
-Stop drug at first sign of rash, unless rash is clearly not drug
related.
- Reduce Lamictal (anticonvulsant) dose if drug is added to a multidrug regimen that includes Valproic Acid (Depakote - anticonvulsant).
- Chewable dispersible tablets may be swallowed whole, chewed, or dispersed in water or diluted fruit juice. If tablets are chewed, give a small amount of water or diluted fruit juice to aid in swallowing.
- Evaluate patients for changes in seizure activity. Check adjunct anticonvulsant level.
- Do not confuse Lamotrigine (Lamictal - anticonvulsant) with Lamivudine (antiretroviral) or Lamictal with Lamisil (antifungal), Ludiomil (antidepressant), Labelatal (Trandate - hypertension), or Lomotil (antidiarrheal).
- Inform patient that drug may cause rash. Combination therapy of Depakote (anticonvulsant) and Lamictal (both anticonvulsants) may cause a serious rash. Tell patient to report rash or signs and symptoms of hypersensitivity promptly because they may warrant stopping drug.
- Warn patient that the drug may trigger sensitivity to the sun and to take precautions until tolerance is determined.
- Warn patient not to engage in hazardous activity until drug's CNS (central nervous system) effects are known.
- Warn patient not to stop drug abruptly.
**MYSOLINE/PRIMIDONE**

*(Anticonvulsant)*

**Indications:** Control of generalized clonic tonic (grand mal) seizures, complex partial seizures, psychomotor or focal epileptic seizures, either alone or with other Anticonvulsants

**Action:** Unknown. Some activity may be caused by Phenlethylmalonamide (PEMAJ) and Phenobarbital (anticonvulsant), which are active metabolites

**Adverse Reactions:**
- CNS: drowsiness, ataxia, emotional disturbances, vertigo, hyperirritability, fatigue, paranoid symptoms
- EENT: Diplopia, nystagmus
- GI: Nausea, vomiting, anorexia
- GU: Polyuria
- Hematologic: Megaloblastic anemia, thrombocytopenia
- Skin: Morbilliform rash

**Dosages:**
- Children younger than 8, initially 50 mg orally at bedtime for 3 days; then 50 mg orally twice a day for days 4 to 6; then 100 mg orally twice a day for days 7 to 9, followed by maintenance dose of 125 mg to 250 mg orally three times a day or 10 mg/kg to 25 mg/kg daily in divided doses. Children over age 8 and adults, initially 100 mg to 125 mg orally at bedtime on days 1 to 3, then 100 mg to 125 mg orally twice a day on days 4 to 6; then 100 mg to 125 mg orally three times a day on days 7 to 9, followed by maintenance dose of 250 mg orally three times a day. Maintenance dose may be increased to 250 mg four times a day, if needed. Dosage may be increased to maximum of 2 grams or 2000 mg daily in divided doses. Available form is tablet in 50 mg and 250 mg. The peak time is 3 – 4 hours.

**Nursing Considerations:** Acetazolamide (Diamox – diuretic), Succinimide (anticonvulsant) may decrease Mysoline (anticonvulsant) level. Monitor level.
- Anticoagulants, Felodipine (Plendil – antihypertensive) may decrease the effects of these drugs. Adjust doses as needed.
- Carbamazepine (Tegretol) may increase Tegretol level and decrease Mysoline and Phenobarbital (all anticonvulsants) levels. Watch for toxicity.
-CNS (central nervous system) Depressants may cause additive CNS (central nervous system) depression. Avoid using together.
-Corticosteroids, Doxycycline (Vibramycin - antiinfective) may decrease the effects of these drugs. Avoid using together, if possible.
-Hormonal Contraceptives may decrease the effectiveness of contraceptives. Recommend alternative birth control method.
-Isoniazid (antitubercular) may increase Mysoline (anticonvulsant) level. Monitor level.
-Metoprolol (Toprol - antianginal), Propranolol (Inderal - antianginal), other beta blockers may reduce effects of these drugs. Consider increasing beta blocker dose.
-Phenytoin (Dilantin - anticonvulsant) may stimulate conversion of Mysoline (anticonvulsant) to Phenobarbital (anticonvulsant/sedative). Watch for increased Phenobarbital (anticonvulsant/sedative) effect.
-Valproic Acid (Depakote (anticonvulsant) may increase Mysoline (anticonvulsant) levels. Decrease Mysoline (anticonvulsant) dose as needed.
-Alcohol use may impair coordination, increase CNS (central nervous system) effects, and cause death. Strongly discourage alcohol use with this drug.
-May decrease hemoglobin level.
-May alter liver function test values. May decrease platelet count.
-Contraindicated in patients hypersensitive to Phenobarbital (anticonvulsant) and in those with porphyria.
-Do not withdraw drug suddenly because seizures may worsen. Notify Physician immediately if adverse reactions develop.
- Therapeutic level of Mysoline is 5 to 12 mcg/ml. Therapeutic level of Phenobarbital (anticonvulsant) is 15 to 40 mcg/ml (both anticonvulsants).
-Monitor CBC and routine blood chemistry every 6 months.
-Brand interchange is not recommended because of documented bioequivalence problems for Mysoline (anticonvulsant) products marketed by different manufacturers.
- Do not confuse Primidone (Mysoline - anticonvulsant) with Prednisone (steroid) or Prinivil (antihypertensive).
- Advise patient to avoid driving and other potentially hazardous activities that require mental alertness until drug’s CNS (central nervous system) effects are known.
- Warn patient and parents not to stop taking drug suddenly.
- Tell patient that full therapeutic response may take 2 weeks or longer.
**NEURONTIN/GABAPENTIN**  
(anticonvulsant)

**Indications:** Adjunctive therapy of partial seizures with or without secondary generalization in patients with seizures; adjunctive treatment to control partial seizures in children; postherpetic neuralgia; pain from diabetic neuropathy

**Actions:** Unknown. Structurally related to GABA (gamma aminobutyric acid) but does not interact with GABA (gamma aminobutyric acid) receptors, is not converted into GABA or GABA agonist, does not inhibit GABA reuptake, and does not prevent degradation.

**Adverse Reactions:**  
CNS: Somnolence, dizziness, ataxia, fatigue, nervousness, amnesia, depression, abnormal thinking, twitching, abnormal coordination, dysarthria, nystagmus, tremor  
Cardiovascular: Peripheral edema, vasodilatation  
Respiratory: Coughing  
EENT: Amblyopia, diplopia, rhinitis, pharyngitis, dry throat, GI: Nausea, vomiting, dyspepsia, constipation, increased appetite, weight, dry mouth  
GU: Frequent urination  
Hematologic: Leukopenia  
Metabolic: Weight gain  
Musculoskeletal: Back pain, fractures, myalgia  
Skin: Pruritus, abrasion  
Other: Dental abnormalities

**Dosages:**  
Children ages 3 to 12, initially 10 mg/kg to 15 mg/kg daily orally in three divided doses, adjusting over three days to reach effective dosage. If needed may increase from 25 mg/kg to 40 mg/kg in divided doses. Children over 12 and adults, initially 300 mg orally three times a day. Increase dosage as needed and tolerated to 1800 mg daily in divided doses. Doses up to 3600 mg daily have been well tolerated.  
Available forms are: capsules in 100 mg, 300 mg, and 400 mg; oral solution 250 mg/5 ml; tablets in 100 mg, 300 mg, 400 mg, 600 mg and 800 mg.

**Nursing Considerations:** Antacids may decrease absorption of Neurontin (anticonvulsant). Separate dosage times by at least 2 hours.
Hydrocodone (Vicodin - opioid analgesic) may increase Neurontin (anticonvulsant) level and decrease Hydrocodone (Vicodin - pain) level. Monitor patient for increased adverse effects or loss of clinical effect.

- May decrease WBC count.
- May cause false positive results with Ames N Multistix SG dipstick test for urine protein when drug is used with other Antiepileptics.
- Contraindicated in patients hypersensitive to drug.
- Give first dose at bedtime to minimize drowsiness, dizziness, fatigue and ataxia.
- If drug is to be stopped or another drug substituted, do so gradually over at least 1 week to minimize risk of seizures.
- Do not suddenly withdraw other Anticonvulsants in patient starting Neurontin (anticonvulsant) therapy.
- Routine monitoring of drug levels is not necessary. Drug does not appear to alter levels of other Anticonvulsants.
- Do not confuse Neurontin (anticonvulsant) with Noroxin (antiinfective)
- Advise patient that drug may be taken without regard to meals.
- Instruct patient to take first dose at bedtime to minimize adverse reactions.
- Tell patient with seizures the maximum time interval between doses should not exceed 12 hours.
- Warn patient to avoid driving and operating heavy machinery until drug's CNS (central nervous system) effects are known.
- Advise patient not to stop drug abruptly.
- Tell patient to keep oral solution refrigerated.
PHENOBarbitAL/LUMINAL SODIUM
(Anticonvulsant)

Indication: Anticonvulsants, febrile seizures, status epilepticus, sedation, short term treatment of insomnia and preoperative sedation

Action: As a Barbiturate, may depress CNS (central nervous system) and increase seizure threshold. As a sedative, may interfere with transmission of impulses from thalamus to cortex of brain

Adverse Reactions: CNS: Drowsiness, lethargy, hangover, paradoxical excitement in elderly patients, somnolence, changes in EEG patterns, physical and psychological dependence
Cardiovascular: Bradycardia, hypotension, syncope
Respiratory: Apnea, respiratory depression
GI: Nausea, vomiting
Hematologic: Exacerbation of porphyria
Skin: Rash, Steven Johnson Syndrome, urticaria, erythema multiforme, pain, swelling, thrombophlebitis, necrosis, nerve injury at injection site
Other: Injection site pain, angioedema

Dosages: Children: for sedation 8 mg - 32 mg/day, for hypnotic - determine dosage using age and weight charts, for anticonvulsant 3 - 6 mg/kg per day oral, usually divided every 12 hours. Drug can be given once daily usually at bedtime, or 10 to 15 mg/kg daily IV or IM. For status epilepticus 15 - 20 mg/kg IV over 10 - 15 minutes. Adults: for sedation 30 mg to 120 mg oral IV or IM daily in two or three divided doses. Maximum dose is 400 mg in 24 hours. For anticonvulsant 60mg - 100mg oral daily for acute seizures, 200 mg - 320 mg IM or IV repeat in 6 hours as necessary, for status epilepticus 200 mg to 600 mg IV. Therapeutic blood levels - 15 - 40. Available forms are: elixir 20 mg/5ml; injection 30 mg/ml, 60 mg/ml, and 130 mg/ml; tablets 15 mg, 30 mg, 60 mg and 100 mg

Nursing Considerations: IV use is reserved for emergency treatment. Give slowly under close supervision. Monitor respirations closely. Do not give more than 60 mg/minute. Have resuscitation equipment available.
-If solution contains precipitate, do not use.
-Dilute drug in half normal, or Normal Saline, D5W, Lactated
Ringers, or Ringers solution.
- Inadvertent intra arterial injection can cause spasm of the artery and severe pain and may lead to gangrene.
- Up to 30 minutes may be required for maximum effect; allow time for anticonvulsant effect to develop to avoid overdose.
- Chloramphenicol (an antiinfective), MAO (Monoamino Oxidase) Inhibitors may potentiate Barbiturate effect. Monitor patient for increased CNS (central nervous system) and respiratory depression.
- CNS (central nervous system) Depressants including Opioid Analgesics may cause excessive CNS (central nervous system) depression. Monitor patient closely.
- Corticosteroids, Doxycycline (Vibramycin - antiinfective), Estrogens (hormones), Hormonal Contraceptives, oral Anticoagulants, and Tricyclic Depressants may enhance metabolism of these drugs. Watch for decreased effects.
- Diazepam (Valium - anticonvulsant/anxiety) may increase effects of both drugs. Use together cautiously.
- Griseofulvin (antibiotic) may decrease absorption of Griseofulvin. Monitor effectiveness of Griseofulvin.
- Meprobamate (barbiturate), Primidone (Mysoline - anticonvulsant) may cause excessive Phenobarbital (anticonvulsant) level. Monitor patient closely.
- Metoprolol (Toprol - antihypertensive), Propranolol (Inderal - heart) may reduce the effects of these drugs. Consider an increased beta-blocker dose.
- Rifampin (antitubercular) may decrease Barbiturate level. Watch for decreased effect.
- Valproic Acid (Depakote - anticonvulsant) may increase Phenobarbital (anticonvulsant/sedative) level. Watch for toxicity.
- Warfarin (Coumadin - blood thinner) may increase Coumadin (blood thinner) metabolism and decrease effect. Monitor patient for decreased Coumadin (blood thinner) effect.
- Evening primrose oil (herb) may increase anticonvulsant dosage requirement. Discourage use together.
- Alcohol use may impair coordination, increase CNS (central nervous system) effects, and lead to death. Strongly discourage
use together.

- May decrease bilirubin level.
- May cause false positive phentolamine (an agent used to diagnose Pheochromocytoma (disease that causes hypertension) test result.
- Contraindicated in patients hypersensitive to Barbiturates and in those with history of manifest or latent porphyria (a metabolic disorder).
- Contraindicated in patients with Hepatic or Renal Dysfunction, Respiratory Disease with dyspnea or obstruction, or Nephritis.
- Use cautiously in patients with acute or chronic pain, depression, suicidal tendencies, history of drug abuse, fever, Hyperthyroidism, Diabetes Mellitus, severe anemia, blood pressure alterations, CV (cardiovascular) Disease, shock, uremia, and in elderly or debilitated patients.
- Give IM injection deeply into large muscles. Superficial injection may cause pain, sterile abscess, and tissue sloughing.
- Watch for signs and symptoms of barbiturate toxicity: coma, cyanosis, asthmatic breathing, clammy skin, and hypotension. Overdose can be fatal.
- Therapeutic level is 15 to 40 mcg/ml.
- Elderly patients are more sensitive to drug's effects; drug may produce paradoxical excitement.
- Do not stop drug abruptly because this may worsen seizures. Call Physician immediately if adverse reactions develop.
- First withdrawal symptoms occur within 8 to 12 hours and include anxiety, muscle twitching, tremor of hands and fingers, progressive weakness, dizziness, visual distortion, nausea, vomiting, insomnia, and orthostatic hypotension. Seizures and delirium may occur within 16 hours and last up to 5 days after abruptly stopping drug.
- Use for insomnia is not recommended, and treatment should not last longer than 14 days.
- Some products contain Tartrazine (a yellow dye found in food coloring); use cautiously in patients with Aspirin sensitivity.
- EEG patterns show a change in low voltage fast activity. Changes persist after therapy ends.
- Drug may decrease bilirubin level in neonates, patients with
epilepsy, and those with congenital nonhemolytic, unconjugated hyperbilirubinemia.

-The physiologic effects of drug may impair the absorption of cyanocobalamin Co57 (a vitamin B12 essential for DNA synthesis).

-Do not confuse Phenobarbital (anticonvulsant) with Pentobarbital (Nembutal - a sedative hypnotic).

-Ensure that patient is aware that drug is available in different milligram strengths and sizes. Advise him to check prescription and refills closely.

-Inform patient that full therapeutic effects are not fully seen for 2 to 3 weeks, except when loading use is used.

-Advise patient to avoid driving and other potentially hazardous activities that require mental alertness until drug’s CNS (central nervous system) effects are known.

-Warn patient and parents not to stop drug abruptly.
TEGRETOL/CARBAMAZEPINE
(Anticonvulsant)

Indications: Generalized tonic clonic and complex partial seizures, mixed seizure patterns, acute manic and mixed episodes associated with Bipolar I Disorder, Trigeminal Neuralgia, Restless Leg Syndrome and Nonneuritic Pain Syndromes (painful neuromas, phantom limb pain)

Action: Thought to stabilize neuronal membranes and limit seizure activity by either increasing efflux or increasing influx of sodium ions across cell membranes in the motor cortex during generation of nerve impulses.

Adverse Reactions: CNS: - dizziness, vertigo, drowsiness, fatigue, ataxia, worsening of seizures, confusion, fever, headache, syncope
Cardiovascular: Congestive heart failure, hypertension, hypotension, aggravation of coronary artery disease, arrhythmias and AV block
Respiratory: Pulmonary hypersensitivity
EENT: Dry pharynx, blurred vision, diplopia, nystagmus, conjunctivitis
GI: Nausea, vomiting, abdominal pain, diarrhea, anorexia, dryness of mouth, glossitis, stomatitis
GU: Urinary frequency, urinary retention, glycosuria, albuminuria
Hematologic: Agranulocytosis, aplastic anemia, thrombocytopenia, eosinophilia, leukocytosis
Hepatic: Hepatitis
Metabolic: Hyponatremia, SIADH (Syndrome of Inappropriate Antidiuretic Hormone)
Skin: Rash, erythema multiforme, Stevens Johnson Syndrome, excessive diaphoresis, urticaria
Other: Chills

Dosages: Children younger than 6, 10 mg/kg to 20 mg/kg in two or three divided doses (conventional tablets or four divided doses (suspension). Maximum dosage is 35 mg/kg in 24 hours.
Children ages 6 to 12, initially 100 mg orally twice a day (conventional or extended release tablets) or 50 mg of suspension orally four times a day with meals, increased at
weekly intervals by up to 100 mg oral divided in three or four doses daily (divided twice a day for extended release form). Maximum 1000 mg daily. Usual maintenance dosage is 400 mg to 800 mg daily or 20 mg/kg to 30 mg/kg in divided doses three or four times daily. Children older than 12 and adults, initially 200 mg orally twice a day (conventional or extended release tablets), or 100 mg orally four times a day of suspension with meals. May be increased weekly by 200 mg orally daily in divided doses at 12 hour intervals for extended release tablets or 6 to 8 hour intervals for conventional tablets or suspension, adjusted to minimum effective level. Maximum, 1000 mg daily in children ages 12 to 15 and 1200 mg daily in patients older than age 15. Usual maintenance dosage is 800 mg to 1200 mg daily. Therapeutic blood level 4 - 12.

Available forms are: capsules (extended-release 100 mg, 200 mg and 300 mg; oral suspension 100 mg/5 mg; tablets 200 mg; tablets (chewable) 100 mg and 200 mg; tablets (extended release) 100 mg, 200 mg, 300 mg and 400 mg. The peak time for tablets is 1½ hours to 12 hours and the peak time for tablets (extended release) is 4 to 8 hours.

Nursing Consideration: Atracurium, Cisatracurium, Pancuronium, Rocuronium, Vecuronium (all blocking agents), may decrease the effects of nondepolarizing muscle relaxant, causing it to be less effective. May need to increase the dose of the nondepolarizing muscle relaxant.

-Cimetadine (Tagamet - stomach), Danazol (sex hormone), Diltiazem (Cardiazem - heart), Fluoxetine (Prozac - antidepressant), Fluvoxamine (Luvox - antidepressant), Isoniazid (antitubercular), Macrolides (antiinfectives), Propoxyphene (Darvon - pain), Valproic Acid (Depakote - anticonvulsant), Verapamil (Calan - heart) may increase Tegretol (anticonvulsant) level. Use together cautiously.

-Clarithromycin (Biaxin - antiinfective), Erythromycin (antiinfective), Troleandomycin (antiinfective) may inhibit metabolism of Tegretol (anticonvulsant), increasing Tegretol (anticonvulsant) level and risk of toxicity. Avoid using together.

-Doxycycline (Vibramycin - antiinfective), Felbamate (Felbatol
- anticonvulsant), Haloperidol (Haldol - antipsychotic), Hormonal Contraceptives, Phenytoin (Dilantin - anticonvulsant), Theophylline (bronchodilator), Tiagabine (Gabitril - anticonvulsant), Topiramate (Topamax - anticonvulsant), Valproate (Depakote - anticonvulsant), Warfarin (Coumadin - blood thinner) may decrease levels of these drugs. Watch for decreased effects.

- Lamictal (anticonvulsant) may decrease Lamictal (anticonvulsant) level and increase Tegretol (anticonvulsant) level. Monitor patient for clinical effects and toxicity.

- Lithium (anticonvulsant) may increase CNS (central nervous system) toxicity of Lithium (antipsychotic). Avoid using together.

- MAO (Monoamine Oxidase) Inhibitors may increase depressant and anticholinergic effects. Avoid using together.

- Phenobarbital (anticonvulsant/sedative), Phenytoin (Dilantin), Primidone (Mysoline) may decrease Tegretol level, all anticonvulsants. Watch for decreased effect.

- Nefazodone (Serzone – antidepressant, not recommended for children with Batten Disease) may increase Tegretol (anticonvulsant) levels and toxicity while reducing Nefazodone (Serzone – antidepressant – not recommended for children with Batten Disease) levels and therapeutic benefits. Use together is contraindicated.

- Plantains (psyllium seed - laxative) may inhibit GI (gastrointestinal) absorption of drug. Discourage use together.

- May increase BUN level. May decrease Hemoglobin level and hematocrit.

- May increase liver function test values and eosinophil and WBC counts. May decrease thyroid function test values and granulocyte and platelet counts.

- May cause false pregnancy test results.

- Contraindicated in patients hypersensitivity to this drug or Tricyclic Antidepressants and in those with a history of bone marrow suppression; also contraindicated in those who have taken an MAO (Monoamine Oxidase) Inhibitor within 14 days.

- Use cautiously in patients with mixed seizure disorders because they may experience an increased risk of seizures.
Also, use with caution in patients with hepatic dysfunction.

- Watch for worsening of seizures, especially in patients with mixed seizure disorders, including atypical absence seizures.
- Obtain baseline determinations of urinalysis, BUN and iron levels, liver function, CBC, and platelet and reticulocyte counts. Monitor these values periodically thereafter.
- Shake oral suspension.
- Contents of extended release capsules may be sprinkled over applesauce if patient has difficulty swallowing capsules. Capsules and tablets should not be crushed or chewed, unless labeled as chewable form.
- When giving by nasogastric tube, mix dose with an equal volume of water, normal saline solution, or D5W. Flush tube with 100 ml of diluent after giving dose.
- Never stop drug suddenly when treating seizures. Notify Physician immediately if adverse reactions occur.
- Adverse reactions may be minimized by gradually increasing dosage.
- Therapeutic level is 4 to 12 mcg/ml. Monitor level and effects closely. Ask patient when last dose was taken to better evaluate drug level.
- When managing seizures, take appropriate precautions.
- Watch for signs of anorexia or subtle appetite changes, which may indicate excessive drug level.
- Do not confuse Tegretol (anticonvulsant) or Tegretol XR (anticonvulsant) with Topamax (anticonvulsant), Toprol XL (heart), or Toradol (antiinflammatory). Do not confuse Carbatrol (anticonvulsant) with Carvedilol (Coreg - antihypertensive).
- Instruct patient to take food to minimize GI (gastrointestinal) distress. Tell patient taking suspension form to shake container well before measuring dose.
- Tell patient not to crush or chew extended release form and not to take broken or chipped tablets.
- Tell patient that Tegretol XR (anticonvulsant) tablet coating may appear in stool because it is not absorbed.
- Advise patient to keep tablets in the original container and to keep the container tightly closed and away from moisture.
Some formulations may harden when exposed to excessive moisture, so that less is available in the body, decreasing seizure control.

- Inform patient that when drug is used for Trigeminal Neuralgia, an attempt to decrease dosage or withdraw drug is usually made every 3 months.
- Advise patient to notify Physician immediately if fever, sore throat, mouth ulcers, or easy bruising or bleeding occurs.
- Tell patient that drug may cause mild to moderate dizziness and drowsiness when first taken. Advise him to avoid hazardous activities until effects disappear, usually within 3 or 4 days.
- Advise patient that periodic eye examinations are recommended.
TRANXENE/CLORAZEPATE DIPOTASSIUM
(Anxiety, Anticonvulsant)

Indications: As a sedative for children with Batten Disease, for anxiety and tension, adjunct for treating partial seizures, management of alcohol withdrawal

Action: Thought to potentiates the effects of GABA (gamma-aminobutyric acid), an inhibitory neurotransmitter, and other neurotransmitters at excitatory synapses to occur at doses well below those necessary to cause sedation, ataxia

Adverse Reactions: CNS: Drowsiness, dizziness, lethargy, sedation, depression, fatigue, nervousness, confusion, irritability, headache, slurred speech, difficulty articulating words, stupor, rigidity, tremor, poor coordination
Cardiovascular: transient hypotension, hypertension, palpitations
EENT: Blurred or double vision
GI: Dry mouth
Hematologic: Neutropenia
Hepatic: Jaundice
Skin: Skin rash, diaphoresis
Other: Weight gain or loss, drug dependence or tolerance

Dosages: Initially, 7.5 mg orally twice a day; increase by no more than 7.5 mg/week. Do not exceed 60 mg/day for children 9 - 12. For children older than 12 and adults initially, 7.5 mg oral three times a day; increase by no more than 7.5 mg/week. Do not exceed 90 mg/day. Each indication may vary in dosages. Available forms include: capsules 3.75 mg, 7.5 mg, and 15 mg; tablets 3.75 mg, 7.5 mg, 11 25 mg, 15 mg, and 22.5 mg. The drug has a rapid onset with a peak of 1 - 2 hours and a duration of days.

Nursing Considerations: Contraindications are those with a hypersensitivity to Benzodiazepines, Acute Angle Closure Glaucoma, Psychosis, concurrent Ketoconazole (Nizoral - antifungal) or Itraconazole (Sporonox - antifungal) therapy, and children younger than age 9.
-Precautions - use cautiously in depression or suicidal ideation, psychotic reaction, elderly patients, or in females
of childbearing age,
-If GI (gastrointestinal) upset occurs, give with food.
-When discontinuing therapy after long-term use, taper dosage gradually over 4 to 8 weeks to avoid withdrawal symptoms.
-Take suicide precautions if patient is depressed or anxious.
-Antacids altered Tranxene (anticonvulsant/anxiety) absorption rate.
-Antidepressants, Antihistamines, Opioids, additive CNS (central nervous system) depression.
-Barbiturates, MAO (Monoamine Oxidase) Inhibitors, other Antidepressants, Phenothiazines, potentiation of Tranxene (anticonvulsant/anxiety) effect.
-Cimetidine (Tagamet - stomach), Disulfram (Antabuse - alcohol abstinence), Fluoxetine (Prozac - antidepressant), Hormonal Contraceptives, Isoniazid (antitubercular), Itraconazole (Sporonox - fungal), Ketoconazole (Nizoral - fungal), Metoprolol (Toprol - heart), Propoxyphene (Darvon - pain), Propranolol (Inderal - heart), Valproic Acid (Depakote - anticonvulsant), decreased Tranxene (anticonvulsant/anxiety) metabolism, causing enhanced drug action or markedly increased CNS (central nervous system) effects.
-Levodopa (antiparkinson) decreased antiparkinsonian effect.
-Probenecid (antigout) has a rapid onset or prolonged action of Tranxene (anticonvulsant/anxiety).
-Rifampin (antitubercular) increased metabolism and decreased efficacy of Tranxene (anticonvulsant/anxiety).
-Theophylline (bronchospasm) decreased sedative effect of Tranxene (anticonvulsant/anxiety).
-Alanine aminotransferase, alkaline phosphatase, aspartate aminotransferase increased levels.
-Chamomile, hops, kava, skull cap, valerian (all herbs) increased CNS (central nervous system) depression.
-Alcohol use increased CNS (central nervous system) depression.
-Smoking decreased drug absorption.
- Evaluate patient for depression, drug dependence, and drug tolerance.
- Monitor blood counts and liver function test results during long term therapy; drug may cause neutropenia and jaundice.
Instruct patient to avoid driving and other hazardous activities until he knows how drug affects concentration and alertness.
- Tell patient to avoid smoking and use of alcohol or other CNS (central nervous system) Depressants.
- Caution patient not to stop therapy abruptly, because withdrawal symptoms may occur.
- As appropriate, review all other significant and life threatening adverse reactions and interactions, especially those related to the drugs, tests, herbs, and behaviors mentioned above.
TOPAMAX/TOPIRAMATE
(Anticonvulsant)

Indication: Initial monotherapy for partial onset or primary generalized tonic clonic seizures; adjunct treatment for partial onset or primary generalized tonic clonic seizures; Lennox Gastaut syndrome; to prevent migraine headaches

Action: Unknown. May block a sodium channel, potentiate the activity of GABA (gamma aminobutyric acid), and inhibit kainate’s ability to activate an amino acid receptor

Adverse Reactions: Children with Batten Disease can occasional see loss of appetite

CNS: Ataxia, confusion, difficulty with memory, dizziness, fatigue, nervousness, paresthesia, psychomotor slowing, somnolence, speech disorders, tremor, generalized tonic clonic seizures, suicide attempts, abnormal coordination, aggressive reaction, agitation, apathy, asthenia, depression, depersonalization, difficulty with concentration, attention or language, emotional lability, euphoria, fever, hallucinations, hyperkinesias, hypertonia, hypoesthesia, insomnia, malaise, mood problems, personality disorder, psychosis, stupor, vertigo

Cardiovascular: Palpitation, vasodilatation, chest pain, edema

Respiratory: Upper respiratory tract infection, dyspnea, bronchitis, coughing

EENT: Diplopia, abnormal vision, nystagmus, conjunctivitis, epistaxis, eye pain, hearing problems, pharyngitis, sinusitis, tinnitus

GI: Anorexia, nausea, abdominal pain, constipation, diarrhea, dry mouth, dyspepsia, flatulence, gastroenteritis, gingivitis, taste perversion, vomiting

GU: Amenorrhea, dysuria, dysmenorrhea, hematuria, intermenstrual bleeding, leucorrhea, menstrual disorder, menorrhagia, urinary frequency, renal calculi, urinary incontinence, UTI (urinary tract infection), vaginitis

Hematologic: Leukopenia, anemia

Metabolic: Decreased weight, increased weight

Musculoskeletal: Arthralgia, back or leg pain, muscle weakness,
myalgia, rigors
Skin: Acne, alopecia, rash, pruritus, increased sweating
Other: Body odor, breast pain, flulike syndrome, hot flashes, lymphadenopathy

Dosages:
Children ages 2 to 16, initially 1 mg/kg to 3 mg/kg daily given at bedtime for 1 week. Increase at 1 or 2 week intervals by 1 mg/kg to 3 mg/kg daily in two divided doses to achieve optimal response. Recommended daily dose is 5 mg/kg to 9 mg/kg in two divided doses. Children over age 10 and adults, initially 25 mg to 50 mg orally daily, increase gradually by 25 mg to 50 mg weekly until an effective daily dose is reached. Adjust to recommended daily dose of 200 mg to 400 mg orally in two divided doses for those with partial seizures or 400 mg orally in two divided doses for those with primary generalized tonic clonic seizures. Available forms are: capsules, sprinkles in 15 mg and 25 mg; tablets 25 mg, 50 mg, 100 mg, and 200 mg.

Nursing Considerations: Tegretol (anticonvulsant) may decrease Topamax (anticonvulsant) level. Monitor patient.
-Carbonic Anhydrase Inhibitors (Acetazolamide (Diamox - diuretic), Dichlorphenamide (Sulfonamide - diuretic) may cause renal calculus formation. Avoid using together.
-CNS (central nervous system) Depressants may cause CNS (central nervous system) depression and other adverse cognitive and neuropsychiatric events. Use together cautiously.
-Hormonal Contraceptives may decrease efficacy. Report changes in menstrual patterns. Advise patient to use another contraceptive method.
-Phenytoin (Dilantin - anticonvulsant) may decrease Topamax (anticonvulsant) level and increase Dilantin (anticonvulsant) level. Monitor levels.
-Valproic Acid (Depakote - anticonvulsant) may decrease Depakote (anticonvulsant) and Topamax (anticonvulsant) level. Monitor patient.
-Alcohol use. May cause CNS (central nervous system) depression and other adverse cognitive and neuropsychiatric events. Discourage use together.
-May increase liver enzyme levels. May decrease Bicarbonate (buffer system in acid-base system) and hemoglobin levels and
hemacrit.
-May decrease WBC count.
- Contraindicated in patients hypersensitive to drug or its components.
- Use cautiously with other drugs that predispose patients to heat-related disorders, including other Carbonic Anhydrase Inhibitors and Anticholinergics.
- If needed, withdraw anticonvulsant (including Topamax - anticonvulsant) gradually to minimize risk of increased seizure activity.
- Monitoring Topamax (anticonvulsant) level is not necessary.
- Drug may infrequently cause oligohidrosis and hyperthermia, mainly in children. Monitor patient closely, especially in hot weather.
- Topamax (anticonvulsant) may cause hyperchloremic. Nonunion gap metabolic acidosis from renal bicarbonate loss. Factors that may predispose patients to acidosis, such as renal disease, severe respiratory disorders, status epilepticus, diarrhea, surgery, ketogenic diet, or drugs, may add to Topamax's (anticonvulsant) bicarbonate lowering effects.
- Measure baseline and periodic bicarbonate levels. If metabolic acidosis develops and persists, consider reducing the dose, gradually stopping the drug, or alkali treatment.
- Drug is rapidly cleared by dialysis. A prolonged period of dialysis may cause low drug level and seizures. A supplemental dose may be needed.
- Stop drug if patient experiences acute myopia and secondary angle closure glaucoma.
- Do not confuse Topamax (anticonvulsant) with Toprol XL (heart), Tegretol or Tegretol XR (both anticonvulsants).
- Tell patient to drink plenty of fluids during therapy to minimize risk of forming kidney stones.
- Advise patient not to drive or operate hazardous machinery until CNS (central nervous system) effects of drug are known. Drug can cause sleepiness, dizziness, confusion, and concentration problems.
- Tell patient to avoid crushing or breaking tablets because of bitter taste.
- Inform patient that drug can be taken without regard to food.
- Tell patient that capsules can either be swallowed whole or carefully opened and contents sprinkled on a teaspoonful of soft food. Tell patient to swallow immediately without chewing.
- Tell patient to notify Physician immediately if he experiences changes in vision.
TRILEPTAL/OXCARBAZEPINE
(Anticonvulsant)

Indications: Adjunctive treatment of partial seizures in patients with epilepsy; to change from multidrug to single drug treatment of partial seizures in patients with epilepsy; to start single drug treatment of patients with partial seizures.

Action: Thought to prevent seizure spread in the brain by blocking voltage sensitive sodium channels, and to produce anticonvulsant effects by increasing potassium conduction and modulating high voltage activated calcium channels.


Dosages: Children ages 4 to 16, initially 8 mg/kg to 10 mg/kg orally daily divided twice a day, not to exceed 600 mg daily. The target maintenance dose depends on patient's weight and should be divided twice a day. If patient weights between 20 kg and 29 kg (44 and 64 pounds), target maintenance dose is 900 mg daily. If patient weighs between 29 and 39 kg (64 and 86
pounds), target maintenance dose is 1200 mg daily. If patient weighs more than 39 kg (86 pounds), target maintenance dose is 1800 mg daily. Target doses should be achieved over 2 weeks. For children over 16 and adults, initially start at 300 mg orally twice a day. Increase by a maximum of 600 mg daily (300 mg orally twice a day) at weekly intervals. Recommended daily dose is 1200 mg orally divided twice a day. Available forms are: oral suspension 300 mg/5ml (60 mg/ml); tablets (film coated) 150 mg, 300 mg, and 600 mg

Nursing Considerations: Carbamazepine (Tegretol - anticonvulsant), Valproic Acid (Depakote - anticonvulsant), Verapamil (Calan - heart) may decrease level of active metabolite of Trileptal (anticonvulsant). Monitor patient and level closely. -Felodipine (Plendil - antihypertensive) may decrease Felodipine level. Monitor patient closely. -Hormonal Contraceptives may decrease levels of Ethinyl estradiol and Levonorgestrel (both contraceptives), reducing hormonal contraceptive effectiveness. Caution women of childbearing age to use alternative forms of contraception. -Phenobarbital (anticonvulsant) may decrease level of active metabolite of Trileptal (anticonvulsant): may increase Phenobarbital (anticonvulsant) level. Monitor patient closely. -Phenytoin (Dilantin - anticonvulsant) may decrease level of active metabolite of Trileptal (anticonvulsant): may increase Dilantin (anticonvulsant) level in adults receiving high doses of Trileptal (anticonvulsant). Monitor Dilantin (anticonvulsant) level closely when starting therapy in these patients. -Alcohol use may increase CNS (central nervous system) depression. Discourage use together. -May decrease sodium and thyroxine levels. -Contraindicated in patients hypersensitive to drug or its components. -Between 25% and 30% of patients with history of hypersensitivity reaction to Tegretol (anticonvulsant) may develop hypersensitivities to Trileptal (anticonvulsant). Ask patient about Tegretol (anticonvulsant) hypersensitivities and stop drug immediately if signs or symptoms of hypersensitivity
occur.
-Shake oral suspension well. Suspension can be mixed with water or swallowed directly from syringe.
-Oral suspension and tablets may be interchanged at equal doses.
-Withdraw drug gradually to minimize potential for increased seizure frequency.
-Watch for signs and symptoms of hyponatremia, including nausea, malaise, headache, lethargy, confusion, and decreased sensation.
-Monitor sodium level in patients receiving Trileptal (anticonvulsant) for maintenance treatment, especially patients receiving other therapies that may decrease sodium levels.
-Trileptal (anticonvulsant) use has been linked to several nervous system-related adverse reactions, including psychomotor slowing, difficulty with concentration, speech or language problems, somnolence, fatigue and coordination abnormalities, such as ataxia and gait disturbances.
-Drug may be taken with or without food.
-Tell patient to contact Physician before interrupting or stopping drug.
-Advise patient to report signs and symptoms of low sodium in the blood, such as nausea, malaise, headache, lethargy, and confusion.
-Multiorgan hypersensitivity reactions may occur. Tell patient to report fever and swollen lymph nodes to his Physician.
-Serious skin reactions, including Stevens Johnson Syndrome and toxic epidermal necrosis, can occur. Advise patient to immediately report skin rashes to his Physician.
-Caution patient to avoid driving and other potentially hazardous activities that require mental alertness until effects of drug are known.
-Tell patient to avoid alcohol while taking drug.
-Advise patient to inform Physician if he has ever experienced hypersensitivity reaction to Tegretol (anticonvulsant).
-Instruct woman using oral contraceptives to use alternative form of contraception while taking drug.
VALIUM/DIAZEPAM
(Antianxiety, Anticonvulsant)

Indications: Anxiety, acute alcohol withdrawal, before endoscopic procedures, muscle spasms, preoperative sedation, cardioversion, adjunct treatment for seizure disorders, status epilepticus, severe recurrent seizures, and patients on stable regimens of antiepileptic drugs who need Diazepam (Valium - anticonvulsant/antianxiety) intermittently to control bouts of increased seizure activity.

Action: A Benzodiazepine that probably potentiates the effects of GABA (gamma aminobutyric acid), depresses the CNS (central nervous system), and suppresses the spread of seizure activity.

Adverse Reactions: CNS: Drowsiness, dysarthria, slurred speech, tremor, transient amnesia, fatigue, ataxia, headache, insomnia, paradoxical, anxiety, hallucinations, minor changes in EEG patterns
Cardiovascular: Cardiovascular collapse, bradycardia, hypotension
EENT: Diplopia, blurred vision, nystagmus
GI: Nausea, constipation, diarrhea with rectal form
GU: Incontinence, urine retention,
Hematologic: Neutropenia
Hepatic: Jaundice
Respiratory: Respiratory depression, apnea
Skin: Rash
Other: Pain, phlebitis at injection site, physical or psychological dependence

Dosages: 1 mg - 2.5 mg orally three or four times a day, increase gradually as needed and tolerated for children age 6 months and older. For adults - depending on severity, 2 mg to 10 mg orally 2 to 4 times a day, or 2 mg to 10 mg IM or IV every 3 to 4 hours as needed. Each indication the dosage may vary.
Available forms: injection 5mg/ml; oral solution 5 mg/ml, 5 mg/5 mg; rectal gel twin packs 2.5 mg (pediatric), 5 mg (pediatric), 10 mg, 15 mg (adult), 20 mg (adult); tablets 2 mg, 5 mg, and 10 mg. The oral route has an onset of 30 minutes with a peak of 2 hours and a duration of 20 - 80 hours; the IV
route has an onset of 1 – 5 minutes with a peak of 1 – 5 minutes and a duration of 15 – 60 minutes; the IM route has a peak of 2 hours and the rectal route has a peak of 90 minutes.

Nursing Considerations: **If status epilepticus occurs - IV access is needed immediately.**
- IV route is more reliable parenteral route; IM route is not recommended because absorption is variable and injection is painful.
- Keep emergency resuscitation equipment and oxygen at bedside.
- Avoid infusion sets or containers made from polyvinyl chloride.
- If possible, inject directly into a large vein. If not, inject slowly through infusion tubing as near to the insertion site as possible. Give at no more than 5 mg/minute. Watch closely for phlebitis at injection site.
- Monitor respirations every 5 to 15 minutes and before each dose. Do not store parenteral solution in plastic syringes.
- Cimetidine (Tagamet - stomach), Disulram (Antabuse - managing chronic alcoholism), Fluoxetine (Prozac - antidepressant), Fluvoxamine (Luvox - antidepressant), Hormonal Contraceptives, Isoniazid (antitubercular), Metoprolol (Toprol - heart), Propoxyphene (Darvon - pain), Propranolol Inderal - heart), Valproic Acid (Depakote - anticonvulsant) may decrease clearance of Valium (anticonvulsant/antianxiety), and increase risk of adverse effects. Monitor patient for excessive sedation and impaired psychomotor function.
- CNS (central nervous system) Depressants may increase CNS (central nervous system) depression. Use together cautiously.
- Digoxin (heart) may increase Digoxin (heart) level and risk of toxicity. Monitor patient and Digoxin (heart) level closely.
- Diltiazem (Cardiazem - heart) may increase CNS (central nervous system) depression and prolong effects of Valium (anticonvulsant/anxiety). Reduce dose of Valium (anticonvulsant/anxiety).
- Fluconazole (Diflucan), Itraconazole (Sporonox), Ketoconazole (Nizoral), Miconazole (Monistat) all antifungals may increase
and prolong Valium (anticonvulsant/anxiety) level, CNS (central nervous system) depression, and psychomotor impairment. Avoid using together.

-Levadopa (antiparkinsonism) may decrease Levadopa (antiparkinson) effectiveness. Monitor patient.

-Phenobarbital (Luminal - anticonvulsant) may increase effects of both drugs. Use together cautiously.

-Kava (herb) may increase sedation. Discourage use together.

-Alcohol use may cause additive CNS (central nervous system) effects. Discourage use together.

-Smoking may decrease effectiveness of drug. Monitor patient closely.

-May increase liver function test values. May decrease neutrophil count.

-Contraindicated in patients hypersensitive to drug or soy protein; in patients experiencing shock, coma, or acute alcohol intoxication (parenteral form); in pregnant women, especially in first trimester, and in children younger than age 6 months (oral form).

-Diastat (Valium – anticonvulsant/antianxiety) rectal gel is contraindicated in patients with Acute Angle Closure Glaucoma.

-Use cautiously in patients with liver or renal impairment, depression, or Chronic Open Angle Glaucoma. Use cautiously in elderly and debilitated patients.

-Use Diastat (Valium – anticonvulsant/antianxiety) rectal gel to treat no more than five episodes per month and no more than one episode every five days because tolerance may develop.

-When using oral solution, dilute dose just before giving.

-Only caregivers who can distinguish cluster of seizures or events from the patient’s ordinary seizure activity, who have been instructed and can give the treatment competently, who understand which seizures may or may not be treated with Diastat (anticonvulsant/antianxiety), and who can monitor the clinical response and recognize when immediate professional and medical evaluation is needed should give Diastat (Valium – anticonvulsant/antianxiety) rectal gel.

-Monitor periodic hepatic, renal, and hematopoietic function studies in patients receiving repeated or prolonged therapy.
-Monitor elderly patients for dizziness, ataxia, mental status changes. Patients are at an increased risk for falls.
-Use of this drug may lead to abuse and addiction. Do not withdraw drug abruptly after long term use; withdrawal symptoms may occur.
-Do not confuse Diazepam (Valium - anticonvulsant/antianxiety) with Diazoxide (Hyperstat an antihypertensive). Warn patient to avoid activities that require alertness and good coordination until effects of drug are known.
-Tell patient to avoid alcohol while taking drug.
-Notify patient that smoking may decrease drug's effectiveness.
-Warn patient not to abruptly stop drug because withdrawal symptoms may occur.
-Instruct patient's caregiver on the proper use of Diastat (Valium - anticonvulsant/antianxiety) rectal gel.
ZONEGRAN/ZONISAMIDE
(Anticonvulsant)

Indications: Adjunctive therapy in partial seizures
Action: May stabilize neuronal membranes and suppress neuronal
hypersynchronization, which prevents seizures
Adverse Reactions: CNS: Somnolence, dizziness, headache, seizures, status
epilepticus, agitation or irritability, anxiety, asthenia, ataxia,
confusion, depression, difficulties in concentration or memory,
difficulties in verbal expression, fatigue, hyperesthesia,
incoordination, insomnia, mental slowing, nervousness,
nystagmus, parenthesis, schizophrenic, or schizophreniform
behavior, speech disorders, tremor
Respiratory: Cough
EENT: Pharyngitis, diplopia, amblyopia, rhinitis, taste
perversion, tinnitus
GI: Anorexia, nausea, dry mouth, anorexia, abdominal pain,
diarrhea, dyspepsia, constipation, vomiting
GU: Kidney stone
Hematologic: Ecchymoses
Metabolic: weight loss
Skin: Rash, pruritus
Other: Accidental injury, flulike syndrome
Dosages:
Children older than 16 and adults, initially start with 100 mg
orally as a single daily dose for 2 weeks. Then, dosage may be
increased to 200 mg daily for at least 2 weeks. Dosage can be
increased to 300 mg and 400 mg orally daily, with the dose
stable at each level. Doses can be given once or twice daily,
except for the daily dose of 100 mg at the start of therapy.
Maximum dose is 600 mg daily. Available form is capsules in 25
mg, 50 mg, and 100 mg. The peak time is 2 – 6 hours.
Nursing Considerations: Drugs that induce or inhibit CYP3A4 changes Zonegran
level, Phenytoin (Dilantin), Carbamazepine (Tegretol),
Phenobarbital, and Valproic Acid (Depakote) increase Zonegran
(all anticonvulsants) clearance. Monitor patient closely.
-May increase BUN and creatinine levels.
-Contraindicated in patients hypersensitive to drug or to
Sulfonamides.
- Contraindicated in those with glomerular filtration rate of less than 50 ml/minute.
- Use cautiously in patients with renal or hepatic dysfunction.
- Use cautiously with other drugs that predispose patients to heat related disorders, including but not limited to Carbonic Anhydrase Inhibitors and drugs with anticholinergic activity.
- Safety and effectiveness in children younger than age 16 have not been established. Children are at increased risk for oligohidrosis and hyperthermia caused by Zonegran (anticonvulsant).
- Rarely, patients receiving Sulfonamides have died because of severe reactions such as Stevens Johnson Syndrome, fulminant hepatic necrosis, aplastic anemia, anemia, otherwise unexplained rashes and agranulocytosis. If signs and symptoms of hypersensitivity or other serious reactions occur, stop drug immediately and notify Physician.
- If patient develops acute renal failure or a significant sustained increase in creatinine or BUN level, stop drug and notify Physician.
- Achieving steady state levels may take 2 weeks.
- Monitor patient for signs and symptoms of hypersensitivity.
- Do not stop drug abruptly because this may cause increased seizures or status epilepticus; reduce dosage or stop drug gradually.
- Increase fluid intake and urine output to help prevent kidney stones, especially in patients with predisposing factors.
- Monitor renal function periodically.
- Tell patient to take drug with or without food and not to bite or break capsule.
- Advise patient to call Physician immediately if he develops or seizures worsen.
- Tell patient to contact Physician immediately if he develops back or abdominal pain, pain when urinating, bloody or dark urine, fever, sore throat, mouth sores or easy bruising, decreased sweating, depression, or speech or language problems.
- Tell patient to drink 6 to 8 glasses of water a day.
- Caution patient that this drug can cause drowsiness and not to
drive or operate dangerous machinery until drug's effects are known.
- Advise patient not to stop taking drug without Physician's approval.
ANTIDEPRESSANTS
Selective Serotonin Reuptake Inhibitors (SSRI's)

Therapeutic Action
The selective Serotonin reuptake inhibitors act as Antidepressants by inhibiting CNS (central nervous system) neuronal uptake of Serotonin and blocking uptake with little effect on Norepinephrine; they are also thought to antagonize muscarinic, histaminergic and adrenergic receptors. The increase in Serotonin levels at neuroreceptors in thought to act as a stimulant, counteracting depression and increasing motivation.

Indications
Treatment of depression; most effective in patients with major depressive disorder.
Treatment of Obsessive Compulsive Disorders.
Unlabeled uses; treatment of Obesity and Bulimia.

Contraindications
Contraindications: hypersensitivity to any SSRI (Selective Serotonin Reuptake Inhibitor); use cautiously with severely impaired hepatic or renal function, diabetes mellitus.

Adverse Effects:
CNS: Headache, nervousness, insomnia, drowsiness, anxiety, tremor, dizziness, light headedness, agitation, sedation, abnormal gait, convulsions.
GI: Nausea, vomiting, diarrhea, dry mouth, anorexia, dyspepsia, constipation, taste changes, flatulence, gastroenteritis, dysphagia, gingivitis.
Dermatologic: Sweating, rash, pruritus, acne, alopecia, contact dermatitis.
CV: Hot flashes, palpitations.
Respiratory: URI's (upper respiratory infections), pharyngitis, cough, dyspnea, bronchitis, rhinitis.
GU: painful menstruation, sexual dysfunction, frequency, cystitis, urgency, vaginitis.
Other: Weight loss, asthenia, fever.
**Overdose Management**

**Symptoms**
CNS: agitation, confusion, hallucinations, hyperactive reflexes, choreoathetosis, seizures, coma.

Anticholinergic: dilated pupils, dry mouth, flushing, hyperpyrexia.

Cardiovascular: depressed myocardial contractibility, decreased heart rate, decreased coronary blood flow, tachycardia, intraventricular block, complete AV block, reentry ventricular arrhythmias, PVC's, ventricular tachycardia or fibrillation, sudden cardiac arrest, hypotension, pulmonary edema.

Treatment: admit to a hospital and monitor EKG closely for 3 - 5 days. Empty stomach in alert patients by inducing vomiting, followed by gastric lavage and charcoal administration, after insertion of ET (endotrachal tube). Maintain respirations and avoid the use of respiratory stimulants. Use normal or half normal saline to prevent water intoxication. To reverse the cardiovascular effects, (hypotension and cardiac dysrhythmias) give hypotonic Sodium Bicarbonate to maintain the pH of the blood, if Sodium Bicarbonate does not work, then possibly vasopressors may need to be added, like Dopamine, to maintain blood pressure, etc., treat shock and metabolic acidosis with IV fluids, oxygen, Bicarbonate and Corticosteroids.

Dosage: dosage levels vary greatly in effectiveness from one patient to another, therefore carefully individualize dosage regimens.

**Clinically Important Interactions**
Drug-Drug – Increased therapeutic and toxic effects of Tricyclic Antidepressants with SSRI's (Selective Serotonin Reuptake Inhibitor). Decreased therapeutic effects with Cyproheptadine (Periactin – an antihistamine).
Drug-Alternative Therapy – increased risk of severe reaction with St. John’s Wort (herb) therapy.

**Nursing Considerations**
**Assessment**
History - Hypersensitivity to any SSRI (Selective Serotonin Reuptake Inhibitor); impaired hepatic or renal function; diabetes mellitus.
Physical - Weight, skin rash, lesions, reflexes, affect bowel sounds, liver evaluation; peripheral perfusion, urinary output, renal function; renal and liver function tests, CBC.

Implementation

- Arrange for lower dose or less frequent administration in elderly patients and patients with hepatic or renal impairment.
- Establish suicide precautions for severely depressed patients. Dispense only a small number of capsules at a time to these patients.
- Administer drug in the morning. If dose of greater than 20 mg per day is needed, administer in divided doses.
- Monitor patient response for up to 4 weeks before increasing dose because of lack of therapeutic effect. It frequently takes several weeks to see the desired effect.
- Provide small, frequent meals if GI (gastrointestinal) upset or anorexia occurs.
- Monitor weight loss, a nutritional consultation may be necessary.
- Provide sugarless lozenges, frequent mouth care if dry mouth is a problem.
- Assure ready access to bathroom facilities if diarrhea occurs. Establish bowel program if constipation is a problem.
- Establish safety precautions (side rails, appropriate lighting, accompanying patient, etc.) if CNS (central nervous system) effects occur.
- Provide appropriate comfort measures if CNS (central nervous system) effects, insomnia, rash, sweating occur.
- Encourage patient to maintain therapy for treatment of underlying cause of depression.

Drug-Specific Teaching Points

- It may take up to 4 weeks to get a full antidepressant effect from the drug. The drug should be taken in the morning (or in divided doses if necessary).
- The following side effects may occur: dizziness, drowsiness, nervousness, insomnia, (avoid driving or performing hazardous tasks); nausea, vomiting, weight loss (small, frequent meals may help; monitor your weight loss - if it becomes marked, consult with your health care provider); sexual dysfunction (drug effect); flulike symptoms (if severe, check with your health care provider for appropriate treatment).
- Report rash, mania, seizures, severe weight loss.
AMITRIPYTILINE/ELAVIL
(Antidepressant)

Indications: Depression relieves symptoms of anxiety and insomnia

Action: A Tricyclic Antidepressant (TCA) that increases the amount of Norepinephrine, Serotonin or both in the CNS (central nervous system) by blocking their reuptake by the presynaptic neurons sedative effect

Adverse Reactions: CNS: Stroke, seizures, coma, ataxia, tremors, peripheral neuropathy, anxiety, insomnia, restlessness, drowsiness, dizziness, weakness, fatigue, headache, extrapyramidal reactions, hallucinations
Cardiovascular: Orthostatic hypotension, tachycardia, heart block arrhythmias, MI (myocardial infarction/heart attack), EKG changes hypertension, edema
EENT: Blurred vision, tinnitus, mydriasis, increased intraocular pressure
GI: Dry mouth, constipation, nausea, vomiting, anorexia, paralytic ileus, epigastric distress, gas, diarrhea
GU: Urine retention, dilatation of urinary tract
Hematologic: Agranulocytosis, thrombocytopenia, leukopenia, eosinophilia
Metabolic: Hypoglycemia, hyperglycemia
Skin: Rash, urticaria, photosensitivity reactions, diaphoresis
Other: Hypersensitivity reaction

Dosages: Adolescents: 10 mg three times a day and 20 mg at bedtime,
Adults: initially 50 mg to 100 mg orally at bedtime, increasing to 150 mg daily. Maximum, 300 mg daily, if needed.
Maintenance, 50 mg to 100 mg daily or 20 to 30 mg IM, four times a day. Available forms: injection - 10 mg/ml; tablets 10 mg, 25 mg, 50 mg, 75 mg, 100 mg, and 150 mg. The peak time for the oral and IM forms is 2 - 12 hours. Blood levels - 110 - 250, 4 - 10 days to reach good blood level or may take up to 30 days.

Nursing Considerations: Barbiturates, CNS (central nervous system) Depressants may enhance CNS (central nervous system) depression. Avoid using together.
-Cimetadine (Tagamet - stomach), Fluoxetine (Prozac -
antidepressant), Fluoxamine (Luvox - antidepressant), Hormonal Contraceptives, Paroxetine (Paxil - antidepressant), Sertraline (Zoloft - antidepressant), may increase Tricyclic Antidepressant level. Monitor drug levels and patient for signs of toxicity.
-Clonidine (Catapres - antihypertensive) may cause life threatening hypertension. Avoid using together.
-Epinephrine, Norepinephrine may increase hypertensive effect. Use together cautiously.
-MAO (Monoamine Oxidase) Inhibitors may cause severe excitation, hyperpyrexia, or seizures, usually with high doses. Avoid using within 14 days of MAO (Monoamine Oxidase) Inhibitor therapy.
-Quinolones may increase the risk of life threatening arrhythmias. Avoid using together.
-Evening primose oil (herb) may cause additive or synergistic effect, resulting in lower seizure threshold and increasing the risk of seizures. Discourage use together.
-St. John's Wort, SAM-e, Yohimbe (herbs) may cause Serotonin syndrome and decrease Elavil (antidepressant) level. Discourage use together.
-Alcohol use may enhance CNS (central nervous system) depression. Discourage use together.
-Smoking may lower drug level. Watch for lack of effect.
-Sun exposure may increase risk of photosensitivity reactions. Advise patient to avoid sunlight exposure.
-May increase or decrease glucose level.
-May increase eosinophil count and liver function test values. May decrease granulocyte, platelet, and WBC counts.
-Contraindicated in patients hypersensitive to drug and in those who have received an MAO (Monoamine Oxidase) Inhibitor within the past 14 days.
-Contraindicated during acute recovery phase of MI (myocardial infarction/acute heart attack).
-Use cautiously in patients with history of Seizures, Urine Retention, Angle Closure Glaucoma, or Increased Intraocular Pressure: in those with Hyperthyroidism, CV (cardiovascular)
Disease, Diabetes, or Impaired Liver Function, and in those receiving thyroid drugs.
-Use cautiously in those receiving electroconvulsive therapy (ECT).
-Parenteral form of drug is for IM administration only. Drug should not be given IV.
-Drug may increase the risk of suicidal thinking and behavior in children and adolescents with major depressive disorder or other psychiatric disorder. Do not use in children younger than age 12.
-Amitriptyline has strong anticholinergic effects and is one of the most sedating Tricyclic Antidepressants.
-Anticholinergic effects have rapid onset even though therapeutic effect is delayed for weeks.
-Elderly patients may have an increased sensitivity to anticholinergic effects of drug; sedating effects of drug may increase the risk of falls in this population.
-If signs or symptoms of psychosis occur or increase, expect Physician to reduce dosage. Record mood changes. Monitor patient for suicidal tendencies and allow only minimum supply of drug.
-Monitor glucose level.
-Watch for nausea, headache, and malaise after abrupt withdrawal of longterm therapy; these symptoms do not indicate addiction.
-Do not withdraw drug abruptly.
-Do not confuse Amitriptyline (Elavil - antidepressant) with Nortriptyline (Pamelor - antidepressant) or Aminophylline (bronchodilator).
-Tell patient to avoid alcohol during drug therapy.
-Advise patient to consult Physician before taking other drugs.
-Warn patient to avoid activities that require alertness and good psychomotor coordination until CNS (central nervous system) effects of drug are known. Drowsiness and dizziness usually subside after a few weeks.
-Advise patients to take a full dose at bedtime - initiate dosage increases late in the afternoon or at bedtime,
but warn them of the possibility of orthostatic hypotension in the morning - so rise slowly from a lying or sitting position.

- Dry mouth can be relieved with sugarless gum or hard candy. Saliva substitutes may be useful.
- Wear sun block and protective clothing to prevent photosensitivity.
- Warn patient not to stop drug abruptly.
- Advise patient that it may take as long as 30 days to achieve full therapeutic effect.
Indication: Depression

Action: An SSRI (Selective Serotonin Reuptake Inhibitor) whose action is presumed to be linked to potentiation of serotonergic activity in the CNS (central nervous system) resulting from inhibition of neuronal reuptake of Serotonin

Adverse Reactions: CNS: Somnolence, insomnia, suicide attempt, anxiety, agitation, dizziness, paraesthesia, migraine, impaired concentration, amnesia, depression, apathy, tremor, confusion, fatigue, fever
CV: Tachycardia, orthostatic hypotension, hypotension
EENT: Rhinitis, sinusitis, abnormal accommodation
GI: Dry mouth, nausea, diarrhea, anorexia, dyspepsia, vomiting, abdominal pain, taste perversion, increased salvia, flatulence, increased appetite
GU: Dysmenorrhea, amenorrhea, polyuria
Metabolic: Decreased or increased weight
Musculoskeletal: Arthralgia, myalgia
Respiratory: Upper respiratory tract infection, coughing
Skin: Rash, pruritis
Other: Increased sweating, yawning

Dosages: 20 mg once daily increasing to 40 mg after no less than 1 week. Maximum recommended dose is 40 mg daily. Available in 10 mg, 20 mg, and 40 mg tablets, also in the same dosages but in the orally disintegrating tablets as well. Celexa (antidepressant) is also available in solution of 10 mg/5 ml. The oral peak time is 4 hours.

Nursing Considerations: Amphetamines, Buspirone (Buspar - anxiety), Dextromethorphan, (Robitussin - antitussive), Dihydroergotamine (Migranal - migraines), Meperidine (Demerol - pain), other SSRI's (Selective Serotonin Reuptake Inhibitor) or Selective Serotonin Norepinephrine Reuptake Inhibitors (Duloxetine (Cymbalta - antidepressant), Venlafaxine (Effexor - antidepressant), Tramadol (Ultram - pain), Trazodone (Desyrel - antidepressant), Tricyclic Antidepressants, Tryptophan (an amino acid) may increase the
risk of Serotonin Syndrome. Avoid other drugs that increase the availability of Serotonin in the CNS (central nervous system): monitor patient closely if used together.

- Carbamazepine (Tegretol - anticonvulsant) may increase Celexa (antidepressant) clearance. Monitor patient for effects.
- CNS (central nervous system) drugs may cause additive effects. Use together cautiously.
- Imipramine (Tofranil - antidepressant), other Tricyclic Antidepressants may increase level of Imipramine (Tofranil) (antidepressant) metabolic Desipramine (Norpramin - antidepressant) by about 50%. Use together cautiously.
- Lithium (antipsychotic) may enhance serotonergic effect of Celexa (antidepressant). Use together cautiously and monitor Lithium (antipsychotic) level.
- MAO (Monoamine Oxidase) Inhibitors, (Phenelzine (Nardil - antidepressant), Selegiline (Eldeprl - antidyskinetic), Tranlcypromine (Parnate - antidepressant) - may cause Serotonin syndrome. Avoid using within 14 days of MAO (Monoamine Oxidase) Inhibitor therapy.
- Sumatriptan (Imitrex - migraines) may cause weakness, hyper-reflexia, and incoordination. Monitor patient closely.
- St. John's Wort (herb) may increase the risk of Serotonin syndrome. Discourage use together.
- Contraindicated in patients hypersensitive to drug or its active components, within 14 days of MAO (Monoamine Oxidase) Inhibitor therapy and in patients taking Pimozide (Orap - antipsychotic).
- Use cautiously in patients with history of mania, seizures, suicidal thoughts, or hepatic or renal impairment.
- Safety and effectiveness of drug have not been established in children.
- Although drug has not been shown to impair psychomotor performance, any psychoactive drug has the potential to impair judgment, thinking, or motor skills.
- The possibility of a suicide attempt is inherent in depression and may persist until significant remission occurs. Closely supervise high risk patients at start of drug therapy. Reduce risk of overdose by limiting amount of drug available per refill.
- Drug may increase the risk of suicidal thinking and behavior in children and adolescents with major depressive disorder or other psychiatric disorders.
- At least 14 days should elapse between MAO (Monoamine Oxidase) Inhibitor therapy and Celexa (antidepressant) therapy.
- Do not confuse Celexa (antidepressant) with Celebrex (to treat osteoarthritis) or Celebyx (to treat seizures).
- Inform patient that, although improvement may take 1 to 4 weeks, he should continue therapy as prescribed.
- Advise patient not to stop therapy abruptly.
- Tell patient that drug may be taken in morning or evening without regard to meals. If drowsiness occurs, he should take drug in evening.
- Tell patient to allow orally disintegrating tablet to dissolve on his tongue then swallow, with or without water. Tell him not to cut, crush, or chew tablets.
- Instruct patient to exercise caution when driving or operating hazardous machinery; drug may impair judgment, thinking or motor skills.
- Advise patient to consult Physician before taking other prescription or OTC (over the counter) drugs.
- Warn patient to avoid alcohol during drug therapy.
CYMBALTA/DULOXETINE HYDROCHLORIDE
(Antidepressant)

Indication: Major depressive disorder and neuropathic pain related to diabetic peripheral neuropathy

Action: May inhibit Serotonin and Norepinephrine reuptake in the CNS (central nervous system)

Adverse Reactions: CNS: Dizziness, fatigue, headache, initial insomnia, somnolence, suicidal thoughts, fever, hypoesthesia, irritability, lethargy, nervousness, nightmares, restlessness, sleep disorder, anxiety, asthenia, tremor
CV: Hot flushes, hypertension, increased heart rate,
EENT: Blurred vision, nasopharyngitis, pharyngolaryngeal pain
GI: Constipation, diarrhea, dry mouth, nausea, dyspepsia, gastritis, vomiting
GU: Abnormally increased frequency of urinating, dysuria, urinary hesitation
Metabolic: Decreased appetite, hypoglycemia, increased appetite, weight gain or loss
Musculoskeletal: Muscle cramps, myalgia
Respiratory: Cough
Skin: Increased sweating, night sweats, pruritis, rash
Other: Rigors

Dosages: 20 mg twice/day initially then 60 mg once daily or divided in two equal doses. Maximum 60 mg daily. Available in capsules (delayed release 20 mg, 30 mg and 60 mg. Peak time is 6 hours.

Nursing Considerations: Antiarrhythmics (Flecainide -Tambocor - heart), (Propafenone - Rythmol - heart), Phenothiazines) may increase levels of these drugs. Use together cautiously.
-CNS (central nervous system) drugs may increase adverse effects. Use together cautiously.
-CYP1A2 inhibitors (Cimetidine -Tagamet- stomach), (Fluvoxamine -Luvox - antidepressant), certain Quinolones) may increase Cymbalta (antidepressant) level. Avoid using together.
-CYP2D6 inhibitors (Fluoxetine -Prozac- antidepressant), Paroxetine (Paxil - antidepressant), (Quinidine - heart) may increase Cymbalta (antidepressant) level. Use together cautiously.
-Drugs that reduce gastric acidity may cause premature breakdown of Cymbalta's (antidepressant) protective coating and early release of the drug. Monitor patient for effects.
-MAO (Monoamine Oxidase) Inhibitors may cause hyperthermia, rigidity, myoclonus, autonomic instability, rapid fluctuations of vital signs, agitation, delirium, and coma. Avoid use within 2 weeks after MAO (Monoamine Oxidase) Inhibitor therapy.
-Thioridazine (Mellaril – antipsychotic, in Canada only) may prolong the QT interval and increase risk of serious ventricular arrhythmias and sudden death. Avoid using together.
-Tricyclic Antidepressants (Amitriptyline (Endep), Nortriptyline, (Pamelor), Imipramine (Tofranil), all antidepressants may increase levels of these drugs. Reduce Tricyclic Antidepressant dose, and monitor drug levels closely.
-Triptans may cause Serotonin Syndrome (restlessness, hallucinations, loss of coordinations, fast heartbeat, rapid changes in blood pressure, increased body temperature, hyperreflexia, nausea, vomiting, and diarrhea). Use cautiously and with increased monitoring, especially when starting or increasing dosages.
-Alcohol use may increase risk of liver damage. Discourage use together.
-May increase alkaline phosphatase, ALT, AST, bilirubin, and CK levels.
-Contraindicated in patients hypersensitive to drug or its ingredients, patients taking MAO (Monoamine Oxidase) Inhibitors, and patients with glaucoma.
-Use cautiously in patients with a history of mania or seizures, patients who drink substantial amounts of alcohol, patients with hypertension, patients with glaucoma, and those with conditions that slow gastric emptying.
-Monitor patient for worsening of depression or suicidal behavior, especially when therapy starts or dosage changes.
-Drug may increase the risk of suicidal thinking and behavior in children and adolescents with major depressive disorder or other psychiatric disorder.
-Treatment of overdose is symptomatic. Do not induce emesis; gastric lavage or activated charcoal may be performed soon
after ingestion or if patient is still symptomatic. Because drug undergoes extensive distribution, forced diuresis, dialysis, hemoperfusion, and exchange transfusion are not helpful. Contact a poison control center for information.

- If taken with Tricyclic Antidepressants, Cymbalta ( antidepressant) metabolism will be prolonged and patient will need extended monitoring.
- Periodically reassess patient to determine the need for continued therapy.
- Decrease dosage gradually, and watch for symptoms that may arise when drug is stopped, such as dizziness, nausea, headache, parathesia, vomiting, irritability, and nightmares.
- If intolerable symptoms arise when decreasing or stopping drug, restart at previous dose and decrease even more gradually.
- Monitor blood pressure periodically during treatment.
- Warn families or caregivers to report signs of worsening depression (such as agitation, irritability, insomnia, hostility, impulsivity) and signs of suicidal behavior to Physician immediately.
- Tell patient to consult his Physician or Pharmacist if he plans to take other prescription or OTC (over the counter) drugs or herbal or other dietary supplement.
- Instruct patient to swallow capsules whole and not to chew, crush, or open them because they have an enteric coating.
- Urge patient to avoid activities that are hazardous or require mental alertness until he knows how the drug affects him.
- Warn patient against drinking alcohol during therapy.
- If patient takes drug for depression, explain that it may take 1 to 4 weeks to notice an effect.
EFFEXOR/VENLAFAXINE HYDROCHLORIDE
(Antidepressant)

Indication: Depression, generalized anxiety disorder, panic disorder, social anxiety disorder, to prevent major depressive disorder relapse

Action: May increase the amount of Norepinephrine, Serotonin, or both in the CNS (central nervous system) by blocking their reuptake by the presynaptic neurons

Adverse Reactions: CNS: Asthenia, headache, somnolence, dizziness, nervousness, insomnia, suicidal behavior, anxiety, tremor, abnormal dreams, paresthesia, agitation
CV: Hypertension, tachycardia, vasodilatation
EENT: Blurred vision
GI: Nausea, constipation, dry mouth, anorexia, vomiting, diarrhea, dyspepsia, flatulence
GU: Urinary frequency, impaired frequency
Metabolic: Weight loss
Skin: Diaphoresis, rash
Other: Yawning, chills, infection

Dosages: 75 mg daily in two or three divided doses with food. Increase as tolerated and needed by 75 mg daily every 4 days. For moderately depressed outpatients, usual maximum dose is 225 mg daily; in certain severely depressed patients, dose may be as high as 375 mg daily. For extended release capsules, 75 mg daily in a single dose. For some patients it may be desirable to start at 37.5 mg daily for 4 to 7 days before increasing to 75 mg daily. Dosage may be increased by 75 mg daily every 4 days to maximum of 225 mg daily. For each indication the dosage may be varied. Tablets are available in 25 mg, 37.5 mg, 50 mg, 75 mg, and 100 mg. Extended release capsules are available in 37.5 mg, 75 mg, and 150 mg. Peak time is 1 - 2 hours.

Nursing Considerations: MAO (Monoamine Oxidase) Inhibitor such as Phenelzine (Nardil - antidepressant), Selegiline Eldepryl - antidyskinetic), Tranyclcyprromine (Parnate - antidepressant) may cause Serotonin Syndrome. Avoid using within 14 days of MAO (Monoamine Oxidase) therapy.
-Tramadol (Ultram - pain) may cause Serotonin Syndrome. Monitor patient closely.
- Triptans may cause Serotonin Syndrome (restlessness, hallucinations, loss of coordinations, fast heart beat, rapid changes in blood pressure, increased body temperature, hyperreflexia, nausea, vomiting, and diarrhea). Use cautiously and with increased monitoring at the start of therapy and with dose increase.
- Yohimbe (herb) may cause additive stimulation. Urge caution.
- Contraindicated in patients hypersensitivity to drug or within 14 days of MAO (Monoamine Oxidase) Inhibitor therapy.
- Use cautiously in patients with renal impairment, diseases or conditions that could affect hemodynamic responses or metabolism, and in those with history of mania or seizures.
- Closely monitor patients being treated for depression for signs and symptoms of clinical worsening and suicidal ideation, especially at the beginning of therapy and with dosage adjustments. Symptoms may include agitation, insomnia, anxiety, aggressiveness, or panic attacks.
- Drug may increase the risk of suicidal thinking and behavior in children and adolescents with major depressive disorder or other psychiatric disorder.
- Carefully monitor blood pressure. Drug therapy may cause sustained, dose-dependent increases in blood pressure. Greatest increases occur in patients taking 375 mg daily.
- Monitor patient’s weight, particularly underweight, depressed patients.
- If medication is to be stopped, inform patient who has received drug for 6 weeks or longer that drug will be stopped gradually by tapering dosage over a 2 week period as instructed by your Physician. Patient should not abruptly stop taking the drug.
- Warn family members to closely monitor patient for signs of worsening condition or suicidal ideations.
- Tell patient to avoid alcohol and to consult Physician before taking other prescription or OTC (over the counter) drugs.
LEXAPRO/ESCITALOPRAM OXALATE
(Antidepressant)

Indication: Treatment and maintenance therapy for patients with major depressive disorder; general anxiety disorder

Action: Antidepressant action may be linked to increase of serotonergic activity in the CNS (central nervous system) from inhibition of neuronal reuptake of Serotonin. Drug is closely related to Celexa, which may be the active component.

Adverse Reactions: CNS: Suicidal behavior, fever, insomnia, dizziness, somnolence, paraesthesia, lightheadedness, migraine, tremor, vertigo, abnormal dreams, irritability, impaired concentration, fatigue, lethargy
CV: Palpatations, hypertension, flushing, chest pain
EENT: Rhinitis, sinusitis, blurred vision, tinnitus, earache
GI: Nausea, diarrhea, constipation, indigestion, abdominal pain, vomiting, increased or decreased appetite, dry mouth, flatulence, heartburn, cramps, gastroesophageal reflux
GU: Menstrual cramps, UTI (urinary tract infection), urinary frequency
Metabolic: Weight gain or loss
Musculoskeletal: Arthralgia, myalgia, muscle cramps, pain in arms or legs
Respiratory: Bronchitis, cough
Skin: Rash, increased sweating
Other: Yawning, flulike symptoms

Dosages: 10 mg once daily increasing to 20 mg if needed after at least 1 week. Available in 5 mg, 10 mg, 20 mg tablets and also 5 mg/5 ml solution. Peak time is 5 hours.

Nursing Considerations: Aspirin, NSAID’s (Nonsteroidal Antiinflammatory Drug - like Ibuprofen), other drugs known to affect coagulation may increase the risk of bleeding. Use together cautiously.
Carbamazepine (Tegretol - anticonvulsant) may increase Lexapro (antidepressant) clearance. Monitor patient for expected antidepressant effect and adjust dose as needed.
Cimetidine (Tagamet - stomach) may increase Lexapro (antidepressant) level. Monitor patient for increased adverse reactions to Lexapro (antidepressant).
-Celexa (antidepressant) may cause additive effects. Using together is contraindicated.
-CNS (central nervous system) drugs may cause additive effects. Use together cautiously.
-Lithium (antipsychotic) may enhance serotonergic effect of Lexapro (antidepressant). Use together cautiously, and monitor Lithium (antipsychotic) level.
-MAO (Monoamine Oxidase) Inhibitors may cause fatal Serotonin syndrome. Avoid using within 14 days of MAO (Monoamine Oxidase) Inhibitor therapy.
-Triptans may increase serotonergic effects, leading to weakness, hyperreflexia, incoordination, rapid changes in blood pressure, nausea, and diarrhea. Use together cautiously, especially at the start of therapy or at dosage increases.
-Tramadol (Ultram - pain) may cause Serotonin syndrome. Monitor patient closely.
-Alcohol use may increase CNS (central nervous system) effects. Discourage use together.
-Contraindicated in taking Pimozide (Orap - antipsychotic), MAO (Monoamine Oxidase) Inhibitors, or within 14 days of MAO (Monoamine Oxidase) Inhibitor therapy and in those hypersensitive to Lexapro, Celexa, (both antidepressants) or any of its inactive ingredients.
-Use cautiously in patients with a history of mania, seizure disorders, suicidal thoughts, or renal or hepatic impairment.
-Use cautiously in patients with diseases that produce altered metabolism or hemodynamic responses.
-Use with caution in elderly patients because they have greater sensitivity to drug.
-Closely monitor patients at high risk of suicide.
-Drug may increase the risk of suicide thinking and behavior in children and adolescents with major depressive disorder or other psychiatric disorder.
-Do not confuse Escitalopram (Lexapro - antidepressant) with Estazolam (Prosom - insomnia).
-Evaluate patient for history of drug abuse and observe for signs of misuse or abuse.
-Periodically reassess patient to determine need for
maintenance treatment and appropriate dosing.
- Inform patient that symptoms should improve gradually over several weeks, rather than immediately.
- Tell patient that although improvement may occur within 1 - 4 weeks, he should continue drug as prescribed.
- Caution patient and patient’s family to report sign’s of worsening depression (such as agitation, irritability, insomnia, hostility, impulsivity) and signs of suicidal behavior to Physician immediately.
- Tell patient to use caution while driving or operating hazardous machinery because of drug’s potential to impair judgment, thinking,
- Tell patient that drug may be taken in the morning or evening without regard to meals.
- Advise patient to consult their Physician before taking other prescription or OTC (over the counter) drugs.
- Encourage patient to avoid alcohol while taking drug.
PAXIL/PAROXETINE HYDROCHLORIDE
(Antidepressant)

Indication: Depression, Obsessive Compulsive Disorder (OCD) and Panic Disorder, Social Anxiety Disorder, Generalized Disorder, Posttraumatic Stress Disorder, Premenstrual Dysorphic Disorder (PMDD), Diabetic Neuropathy

Action: Thought to be linked to drug's inhibition of CNS's (central nervous system) neuronal uptake of Serotonin

Adverse Reactions: CNS: Asthenia, dizziness, headache, insomnia, somnolence, tremor, nervousness, suicidal behavior, anxiety, paresthesia, confusion, agitation
CV: Palpatations, vasodilation, orthstatic hypotension
EENT: Lump or tightness in throat
GI: Dry mouth, nausea, constipation, diarrhea, flatulence, vomiting, dyspepsia, dysgeusia, increased or decreased appetite, abdominal pain
GU: Urinary frequency, other urinary disorders
Musculoskeletal: Myopathy, myalgia, myasthenia gravis
Skin: Diaphoresis, rash, pruritus
Other: Yawning

Dosages: 20 mg daily preferably in morning. If patient does not improve, increase dose by 10 mg daily at intervals of at least 1 week to a maximum of 50 mg daily. If using controlled release form, initially 25 mg daily. Increase dose by 12.5 mg daily at weekly intervals to a maximum of 62.5 mg daily. For each indication, doses may vary. Available in suspension – 10 mg/5 ml; Tablets – 10 mg, 20 mg, 30 mg, and 40 mg; Tablets controlled release – 12.5 mg, 25 mg, and 37.5 mg. Oral peak time is 8 hours and oral (controlled release) time is 6 - 10 hours.

Nursing Considerations: Amphetamines, Buspirone (Buspar - anxiety), Dextromethorphan (Robitussin - antitussive), Dihydroergotamine (Migranal - migraines), Lithium (antipsychotic), Meperidine (Demerol - pain), other SSRI's (Selective Serotonin-Norepinephrine Reuptake Inhibitors), (Duloxetine - Cymbalta - antidepressant), (Venlafaxine - Effexor - antidepressant), (Tramadol - Ultram - pain), (Trazodone - Deseryl - antidepressant), Tricyclic Antidepressants, Tryptophan (an
amino acid) may increase the risk of Serotonin Syndrome. Avoid combining drugs that increase the availability of Serotonin in the CNS (central nervous system); monitor patient closely if used together.
- Cimetidine (Tagamet - stomach) may decrease hepatic metabolism of Paxil (antidepressant), leading to risk of adverse reactions.
  Dosage adjustments may be needed.
- Digoxin (heart) may decrease Digoxin (heart) level. Use together cautiously.
- MAO (Monoamine Oxidase Inhibitor) such as Phenelzine (Nardil - antidepressant), Selegiline (Eldepryl - antidyskinetic), Tranylcypromine (Parnate - antidepressant) may cause Serotonin syndrome. Avoid using within 14 days of MAO (Monoamine Oxidase Inhibitor) therapy.
- Phenobarbital (Luminal - sedative), Phenytoin (Dilantin - anticonvulsant) may alter pharmacokinetics of both drugs. Dosage adjustments may be needed.
- Procyclidine (Kemadrin - to treat parkinsonism) may increase drug level. Watch for excessive anticholinergic effects.
- Sumatriptan (Imitrex - to treat migraines) may cause weakness, hyperreflexia, and incoordination. Monitor patient closely.
- Theophylline (bronchospasm) may decrease drug clearance. Monitor drug level.
- Thioridazine (Canada only - Mellaril - antipsychotic) may prolong QT interval and risk of serious ventricular arrhythmias. Avoid using together.
- Tricyclic Antidepressants may inhibit Tricyclic Antidepressant metabolism. Dose of Tricyclic Antidepressants may need to be reduced. Monitor patient closely.
- Tripans may cause Serotonin Syndrome (restlessness, hallucinations, loss of coordination, fast heartbeat, rapid changes in heartbeat, increased body temperature, overactive reflexes, nausea, vomiting, and diarrhea). Use cautiously, especially at the start of therapy and at dosage increases.
- Warfarin (Coumadin - blood thinner) may cause bleeding. Use together cautiously.
-St. John’s Wort (herb) may increase sedative/hypnotic effects. Discourage use together.
-Alcohol use may alter psychomotor function. Discourage use together.
-Contraindicated in patients hypersensitive to drug, with 14 days of MAO (Monoamine Oxidase Inhibitor) therapy, and in those taking Thioridazine (Mellaril - an antipsychotic, only in Canada).
-Contraindicated in children and adolescents under age 18 for major depressive disorders.
-Use cautiously in patients with history of seizure disorders or mania and in those with other severe, systemic illness.
-Use cautiously in patients at risk for volume depletion and monitor them appropriately.
-Patients taking drug may be at increased risk for developing suicidal behaviors, but this has not been definitely attributed to use of the drug.
-Patients taking Paxil CR (antidepressant) for PMDD (Premenstrual Dysphoric Disease) should be periodically reassessed to determine the need for continued treatment.
-If signs or symptoms of psychosis occur or increase, expect Physician to reduce dosage. Record mood changes. Monitor patient for suicidal tendencies, and allow only a minimum supply of drug.
-Drug may increase the risk of suicidal thinking and behavior in children and adolescents with major depressive disorder or other psychiatric disorder.  
-Do not stop drug abruptly. Withdrawal or discontinuation syndrome may occur if drug is stopped abruptly, symptoms include headache, myalgia, lethargy, and general flulike symptoms. Taper drug slowly over 1 - 2 weeks.
-Do not confuse Paroxetine (Paxil - antidepressant) with Paclitaxel (Taxol - antineoplastic), or Paxil (antidepressant) with Doxil (an antineoplastic), or Paxil (antidepressant) with Plavix (an antiplatelet).
-Tell patient that drug may be taken with or without food, usually in the morning.
-Tell patient not to break, crush, or chew controlled release tablets.
- Warn patient to avoid activities that require alertness and good coordination until effects of drug are known.
- Tell patient to avoid alcohol and to consult Physician before taking other prescription or OTC (over the counter) drugs or herbal medicines.
- Instruct patient not to stop taking drug abruptly.
PROZAC/FLUXETINE HYDROCHLORIDE
(Antidepressant)

Indication: Depression, Obsession Compulsive Disorder (OCD), depression in elderly patients, maintenance therapy for depression in stabilized patients (not for newly diagnosed depression), short term treatment of panic disorder with or without agoraphobia, anorexia nervosa in weight restored patients, depression caused by bipolar disorder, cataplexy, alcohol dependence, Premenstrual Dysphoric Disorder (PMDD)

Action: Thought to be linked to drug’s inhibition of CNS (central nervous system) neuronal uptake of Serotonin

Adverse Reactions: CNS: Nervousness, somnolence, anxiety, insomnia, headache, drowsiness, tremor, dizziness, asthenia, suicidal behavior, fatigue, fever
CV: Palpitations, hot flashes
EENT: Nasal congestion, pharyngitis, sinusitis
GI: Nausea, diarrhea, dry mouth, anorexia, dyspepsia, constipation, abdominal pain, vomiting, flatulence, increased appetite
Metabolic: Weight loss
Musculoskeletal: Muscle pain
Respiratory: Upper respiratory tract infection, cough, respiratory distress
Skin: Rash, pruritus, diaphoresis
Other: Flulike syndrome

Dosages: 10 mg daily for children 8 - 18, for depression once daily for 1 week, then increase to 20 mg daily. For Obsessive Compulsive Disorder (OCD) - in children, dosage is 20 mg - 60 mg daily. For each indication, dosage may vary. Available forms: capsules (delayed release) 90 mg; capsules (pulvules) 10 mg, 20 mg, and 40 mg; oral solution 20 mg/5 ml; tablets 10 mg and 20 mg. Peak is 6 - 8 hours.

Nursing Considerations: Amphetamines, Buspirone (Buspar - anxiety), Lithium Salts (antipsychotic), Meperidine (Demerol - pain), other SSRI’s (Selective Serotonin Norepinephrine Reuptake Inhibitors), Duloxetine (Cymbalta - antidepressant), Venlafaxine (Effexor - antidepressant), Tramadol (Ultram - pain), Trazadone (Deseyrl -
antidepressant), Tricyclic Antidepressants, Tryptophan (amino acid) may increase the risk of Serotonin Syndrome. Avoid combinations of drugs that increase the availability of Serotonin in the CNS (central nervous system); monitor patient closely if used together.

- Benzodiazepines, Lithium (antipsychotic), Tricyclic Antidepressants may increase CNS (central nervous systems) effects. Monitor patient closely.
- Beta Blockers, Carbamazepine (Tegretol - anticonvulsant), Flecanide (Tambocor - heart), Vinblastine (antineoplastic) may increase levels of these drugs. Monitor drug levels and monitor patient for adverse reactions.
- Cyproheptadine (Periactin – antihistamine ) may reverse or decrease Prozac (aniconvulsant) effect. Monitor patient closely.
- Dextromethorphan (Robitussin - antitussive) may cause unusual side effects, such as visual hallucinations. Advise use of cough suppressant that does not contain Dextromethorphan Robitussin - antitussive) while taking Prozac (antidepressant).
- Insulin, oral Antidiabetics: may alter glucose level and antidiabetic requirements. Adjust dose.
- Highly protein-bound drugs may increase level of Prozac (antidepressant) or other highly protein-bound drugs. Monitor patient closely.
- MAO (Monoamine Oxidase Inhibitor), (Phenelzine (Nardil - antidepressant), Selegiline (Eldepryl - antidyskinetic), Tranylcypromine (Parnate - antidepressant) may cause Serotonin Syndrome. Avoid using at the same time and for at least 5 weeks after stopping.
- Phenytoin (Dilantin - anticonvulsant) may increase Phenytoin (Dilantin - anticonvulsant) level and risk of toxicity. Monitor Phenytoin (Dilantin - anticonvulsant), level and adjust dosage.
- Triptans may cause weakness, hyperreflexia, incoordination, rapid changes in blood pressure, nausea and diarrhea. Monitor patient closely, especially at the start of treatment and when dosage increases.
- Thioridazine (Mellaril – antipsychotic, Canada only) may increase Thioridazine (Mellaril – antipsychotic) level, increasing risk of serious ventricular arrhythmias and sudden death. Avoid
using at the same time and for at least 5 weeks after stopping.
-Warfarin (Coumadin – blood thinner) may increase risk for bleeding. Monitor PT and INR.
-St. John's Wort (herb) may increase sedative and hypnotic effects; may cause Serotonin Syndrome. Discourage use together.
-Alcohol use may increase CNS (central nervous system) depression. Discourage use together.
-Contraindicated in patients hypersensitive to drug and in those taking MAO (Monoamine Oxidase) Inhibitors within 14 days of starting treatment.
-MAO (Monoamine Oxidase) Inhibitors should not be started within 5 weeks of stopping Prozac. Avoid using Thioridazine (Mellaril – an antipsychotic, Canada only) with Prozac (antidepressant) or within 5 weeks after stopping Prozac (antidepressant).
-Use cautiously in patients at high risk for suicide and in those with history of diabetes mellitus, seizures, mania, or hepatic, renal, or CV (cardiovascular) disease.
-Use Antihistamines or topical Corticosteroids to treat rashes or pruritus.
-Watch for weight change during therapy, particularly in underweight or bulimic patients.
-Record mood changes. Watch for suicide tendencies.
-Drugs may increase the risk of suicidal thinking and behavior in children and adolescents with major depressive disorder or other psychiatric disorder.
-Drug has a long halflife; monitor patient for adverse effects for up to 2 weeks after drug is stopped.
-Do not confuse Fluoxetine (Prozac - antidepressant) with Fluvoxamine (Luvox - antidepressant) or Fluvastatin (Lescol – to reduce cholesterol). Do not confuse Prozac (antidepressant) with Proscar (same as Propecia - for hair loss), Prilosec – antacid), or Prosom (insomnia). Tell patient to avoid taking drug in the afternoon whenever possible because doing so commonly causes nervousness and insomnia.
-Drug may cause dizziness or drowsiness. Warn patient to avoid driving and other hazardous activities that require alertness and
good psychomotor coordination until effects of drug are known.
- Tell patient to consult Physician before taking other
  prescription or OTC (over the counter) drugs.
- Advise patient that full therapeutic effect may not be seen for
  4 weeks or longer.
REMERON/SOLTAB
(Antidepressant)

Indication: Depression
Action: Thought to enhance central noradrenergic and serotonergic activity
Adverse Reactions: CNS: Somnolence, suicidal behavior, dizziness, asthenia, abnormal dreams, tremors, abnormal thinking, tremors, confusion
CV: Edema, peripheral edema
GI: Increased appetite, dry mouth, constipation, nausea
GU: Urinary frequency
Metabolic: Weight gain
Musculoskeletal: Back pain, myalgia
Respiratory: Dyspnea
Other: Flulike syndrome
Dosages: 15 mg at bedtime initially, maintenance dose is 15 mg to 45 mg daily. Adjust dosage at intervals of at least 1 week. Available in 15 mg, 30 mg, and 45 mg tablets. Peak time is 2 hours.
Nursing Considerations: Diazepam (Valium – anticonvulsant/anxiety), other CNS (central nervous system) Depressants may cause additive CNS (central nervous system) effects. Avoid using together.
-MAO (Monoamine Oxidase) Inhibitors may sometimes cause fatal reactions. Avoid using within 14 days of MAO (Monoamine Oxidase) Inhibitor therapy.
-Alcohol use may cause additive CNS (central nervous system) effects. Discourage use together.
-May increase ALT, cholesterol, and triglyceride levels.
-Contraindicated in patients hypersensitive to drug and within 14 days of MAO (Monoamine Oxidase) Inhibitor therapy.
-Use cautiously in patients with CV (cardiovascular) or Cerebrovascular Disease, Seizure Disorders, Suicidal thoughts, hepatic or renal impairment, or history of mania or hypomania.
-Use cautiously in patients with conditions that predispose them to hypotension, such as dehydration, hypovolemia, or antihypertensive therapy.
-Give drug cautiously to elderly patients; decreased clearance has occurred in this age group.
- Do not use Remeron (antidepressant) within 14 days of MAO (Monoamine Oxidase Inhibitor) therapy.
- Record mood changes. Watch for suicidal tendencies.
- Drug may increase the risk of suicidal thinking and behavior in children and adolescents with major depressive disorder or other psychiatric disorder.
- Although agranulocytosis occurs rarely, stop drug and monitor patient closely if he develops a sore throat, fever, stomatitis, or other signs and symptoms of infection with a low WBC count.
- Lower dosages tend to be more sedating than higher dosages.
- Caution patient not to perform hazardous activities if he gets too sleepy.
- Tell patient to report signs and symptoms of infection, such as fever, chills, sore throat, mucous membrane irritation, or flulike syndrome.
- Instruct patient not to use alcohol or other CNS (central nervous system) Depressants while taking drug.
- Stress importance of following Physician’s orders.
- Instruct patient not to take other drugs without Physician’s approval.
- Advise patient not to break or split tablet.
WELLBUTRIN/BUPROPION HYDROCHLORIDE
(Antidepressants)

Indication: Seasonal affective disorder, depression
Action: Unknown. Drug does not inhibit MAO (Monoamine Oxidase Inhibitor), but it weakly inhibits Norepinephrine, Dopamine, and Serotonin reuptake. Noradrenergic or dopaminergic mechanisms, or both, may cause drug’s effect.
Adverse Reactions: CNS: Abnormal dreams, insomnia, headache, sedation, tremor, agitation, dizziness, seizures, suicidal behavior, anxiety, confusion, delusions, euphoria, fever, hostility, impaired concentration, impaired sleep quality, akinesia, akathisia, fatigue, syncope
CV: Tachycardia, arrhythmias, hypertension, hypotension, palpitations, chest pain
EENT: Blurred vision, rhinitis, auditory disturbances, epistaxis, pharyngitis, sinusitis
GI: Constipation, nausea, vomiting anorexia, dry mouth, taste disturbance, dyspepsia, diarrhea, abdominal pain
GU: Menstrual complaints, urinary frequency, urine retention
Metabolic: Increased appetite, weight loss, weight gain
Musculoskeletal: Arthritis, myalgia, arthralgia, muscle spasm or twitch
Respiratory: Upper respiratory complaints, increase in coughing
Skin: Excessive sweating, pruritis, rash, cutaneous temperature disturbance, urticaria
Other: Fever and chills, accidental injury
Dosages: 100 mg twice daily, may increase after 3 days to 100 mg three times/day. If no improvement may increase to 150 mg three times/day. Allow at least 6 hours between doses. Maximum daily dose is 450 mg. Available forms: tablets (extended release) 150 mg and 300 mg; tablets (immediate release) 75 mg and 100 mg; tablets (sustained released) 100 mg, 150 mg, and 200 mg. Peak is in 2 hours.
Nursing Considerations: Amantadine (Symmetrel - antiparkinsonian), Levodopa (antiparkinsonian) may increase risk of adverse reactions. If used together, give small first doses of Wellbutrin (antidepressant) and increase dosage gradually.
-Antidepressants, Antipsychotics, Systemic Corticosteroids, Theophylline (bronchodilator) may lower seizure threshold. Use cautiously together.
-Beta Blockers, class IC Antiarrhythmics may increase levels of these drugs and adverse reactions. Use a reduced dose if used with Wellbutrin (antidepressant).
-Carbamazepine (Tegretol - anticonvulsant), Phenobarbital (Luminal - anticonvulsant/sedative), Phenytoin (Dilantin - anticonvulsant) may enhance metabolism of Wellbutrin (antidepressant) and decrease its effect. Monitor patient closely.
-MAO (Monoamine Oxidase) Inhibitors may increase the risk of Wellbutrin (antidepressant) toxicity. Do not use drugs within 14 days of each other.
-Sun exposure may increase risk of photosensitivity reactions. Advise patient to avoid excessive sunlight exposure.
-May increase liver function test values.
-Contraindicated in patients hypersensitive to drug, and in those with seizure disorders or history of bulimia or anorexia nervosa because of a higher risk of seizures.
-Do not use with other drugs containing Wellbutrin (antidepressant).
-Use cautiously in patients with recent history of MI (myocardial infarction/heart attack), Unstable Heart Disease, Renal or Hepatic Impairment, a history of Seizures, Head Trauma, or other predisposition to Seizures, and in those being treated with drugs that lower seizure threshold.
-Many patients experience a period of increased restlessness, including agitation, insomnia, and anxiety, especially at start of therapy.
-To minimize the risk of seizures, do not exceed maximize recommended dose.
-Patient with major depressive disorder may experience a worsening of depression and suicidal thoughts. Carefully monitor patient for worsening depression or suicidal thoughts, especially at the beginning of therapy, and during dosage changes.
-Drug may increase the risk of suicidal thinking and behavior in children and adolescents with major depressive disorder or
other psychiatric disorder.

- In switching patients from regular or sustained release tablets to extended release tablets, give the same total daily dose (when possible) as the once daily dosage provided.
- Closely monitor patient with Bipolar Disorder.
- Antidepressants can cause manic episodes during the depressed phase of Bipolar Disorder. This may be likely to occur with Wellbutrin (antidepressant) than with other Antidepressants.
- Do not confuse Bupropion (Wellbutrin) with Buspirone (Buspar – anxiety) or Wellbutrin (antidepressant) (Trade name) with Wellcovorin (a vitamin complex used to treat colon cancer).
- Explain that abrupt withdrawal from Sedatives or Stimulants during therapy may increase risk of seizures. Seizure risk is also increased in those using OTC (over the counter) stimulants and in diabetic patients using oral Antidiabetics or insulin.
- Advise patient to consult Physician before taking other prescription or OTC (over the counter) drugs.
- Advise patient to avoid hazardous activities that require alertness and good psychomotor coordination until effects are known.
- Tell patient that it may take up to 4 weeks to reach full antidepressant effect.
- Advise patient to report mood swings or suicidal thoughts immediately.
- Tell patient not to chew, crush, or divide tablets.
- Inform patient that tablets may have an odor.
ZOLOFT/SERTRALINE HYDROCHLORIDE
(Antidepressant)

Indication: Depression, Obsessive Compulsive Disorder (OCD), Panic Disorder, Posttraumatic Disorder, Premenstrual Dysphoric Disorder (PMDD), and Social Anxiety Disorder

Action: Thought to be linked to drug’s inhibition of CNS (central nervous system) neuronal uptake of Serotonin.

Adverse Reactions:
- CNS: Fatigue, headache, tremor, dizziness, insomnia, somnolence, suicidal behavior, paresthesia, hypesthesia, nervousness, anxiety, agitation, hypertonia, twitching, confusion
- CV: Palpatations, chest pain, hot flashes
- GI: Dry mouth, nausea, diarrhea, loose stools, dyspepsia, vomiting, constipation, thirst, flatulence, anorexia, abdominal pain, increased appetite
- Musculoskeletal: Myalgia
- Skin: Rash, pruritus, diaphoresis

Dosages: 50 mg daily. Adjust dose as needed and tolerated; dosage range is 50 mg to 200 mg daily. Each indication may vary. Available in capsules of 25 mg, 50 mg, and 100 mg; oral concentrate 20 mg/ml; tablets 25 mg, 50 mg, and 100 mg. Peak time is 4 to 8 hours.

Nursing Considerations:
- Amphetamines, Buspirone (Buspar - antianxiety), Dextromethorphan (Robitussin - antitussive), Dihydroergotamine (Migranal - migraines, a vasoconstrictor), Lithium (antipsychotic), Meperidine (Demerol - pain), SSRI's (Selective Serotonin-Norepinephrine Reuptake Inhibitors), Duloxetine (Cymbalta - antidepressant), Venlafaxine (Effexor - antidepressant), Sumatriptan (Imitrex - migraines), Tramadol (Ultram - pain), Trazodone (Deseyrl - antidepressant), Tricyclic Antidepressants, Tryptophan (an amino acid) may increase the risk of Serotonin Syndrome. Avoid combinations of drugs that increase the availability of Serotonin in the CNS (central nervous system), monitor patient closely if used together.
- Benzodiazepines, Tolbutamide (Orinase for diabetics - Canada only) may decrease clearance of these drugs. Significance unknown; monitor patient for increased drug effect.
- Cimetadine (Tagamet - stomach) may decrease clearance of
Zoloft (antidepressant). Monitor patient closely.
-Disulfiram (Antabuse - management of alcohol abstinence): oral concentrate contains alcohol, which may react with drug. Avoid using together.
-MAO (Monoamine Oxidase) Inhibitors such as Phenelzine (Nardil - antidepressant), Selegiline (Eldepryl - antidyskinetic), Tranylcypromine (Parnate - antidepressant) may cause Serotonin Syndrome. Avoid using within 14 days of MAO Monoamine Oxidase) therapy.
-Pimozide (Orap - antipsychotic) may increase Pimozide (Orap - antipsychotic) drug level. Avoid using together.
-Triptans may cause Serotonin Syndrome (restlessness, hallucinations, loss of coordination, fast heartbeat, rapid changes in blood pressure, increased body temperature, hyperreflexia, nausea, vomiting, and diarrhea). Use cautiously, with close monitoring, especially at the start of treatment and during dosage adjustments.
-Warfarin (Coumadin – blood thinner), other highly protein-bound drugs may increase level of Zoloft (antidepressant) or other highly protein bound drug. May increase PT, or INR may increase by 8%. Monitor patient closely.
-St. John’s Wort (herb) may cause additive effects and Serotonin Syndrome. Discourage use together.
-May increase ALT and AST levels.
-Contraindicated in patients with a hypersensitivity to drug or its components. Contraindicated in patients taking Pimozide (Orap - antipsychotic) or MAO (Monoamine Oxidase) Inhibitors or within 14 days of MAO (Monoamine Oxidase) Inhibitor therapy.
-Use cautiously in patients at risk for suicide and in those with seizure disorders, or diseases or conditions that affect metabolism or hemodynamic responses.
-Give Zoloft (antidepressant) once daily, either in morning or evening, with or without food.
-Make dosage adjustments at intervals of no less than 1 week.
-Record mood changes. Monitor patient for suicidal tendencies and allow only a minimum supply of the drug.
-Drug may increase the risk of suicidal thinking and behavior in
children and adolescents with major depressive disorder or other psychiatric disorder.
- Do not use the oral concentration dropper, which is made of rubber, in a patient with latex allergy.
- Advise patient to use caution when performing hazardous tasks that require alertness.
- Tell patient to avoid alcohol and to consult Physician before taking OTC (over the counter) drugs.
- Advise patient to mix the oral concentrate with 4 ounces (1/2 cup) of water, ginger ale, lemon or lime soda, lemonade, or orange juice, and to take the dose right away.
- Instruct patient to avoid stopping drug abruptly.
ANTIFUNGALS

Therapeutic Action
Antifungals bind to or impair sterols of fungal cell membranes, allowing increased permeability and leakage of cellular components and causing death of the fungal cell.

Indications
Systemic fungal infections: Candidiasis, Chronic Mucocutaneous Candidiasis, Oral Thrush, Cansisuria, Blastomycosis, Coccidioidomycosis, Histoplasmosis, Chromomycosis, Paracoccidioidomycosis, Dermatophytosis, Ringworm infections of the skin.
Unlabeled uses: treatment of Onychomycosis, Pityriasis versicolor, vaginal Candidiasis, CNS (central nervous system) fungal infections (high doses); topical treatment of tinea corporis and tinea curris caused by Trichophyton rubrum, Trichophyton mentagrophytes and Epidermophyton floccosum; treatment of tinea vericolor caused by Malassezia furfur (topical) and reduction of scaling due to dandruff (shampoo).

Contraindications/Cautions
Contraindications: allergy to any antifungal, fungal meningitis. Use with caution in the presence of hepatocellular failure (increased risk of hepatocellular necrosis).

Adverse Effects
CNS: Headache, dizziness, somnolence, photophobia
GI: Hepatotoxicity, nausea, vomiting, abdominal pain
Hematologic: Thrombocytopenia, leucopenia, hemolytic anemia
Hypersensitivity: Urticaria to anaphylaxis
General: Pruritus, fever, chills, gynecomastia
Local: Severe irritation, pruritus, stinging with topical application

Clinically important interactions
Drug - Drug
Decreased blood levels with Rifampin (antitubercular).
Increased blood levels of Cyclosporine (antirejection) and risk of toxicity with Antifungals
Increased duration of adrenal suppression when Methylprednisolone (steroid), Corticosteroids are taken with Antifungals.
Risk of Cardiac Arrhythmias and even death with Antihistamines

Nursing Considerations
History: Allergy to Antifungals, fungal meningitis, hepatocellular failure
Physical: Skin color, lesions; orientation, reflexes, affect; bowels sounds, liver evaluation; liver function tests; CBC and differential; culture of area involved

Implementation
- Arrange for culture before beginning therapy; treatment should begin, prior to lab results
- Maintain Epinephrine on standby in case of severe anaphylaxis after first dose
- Administer oral drug with food to decrease GI (gastrointestinal) upset
- Administer until infection is eradicated: Candidiasis, 1 - 2 weeks; other Systemic Mycosis, 6 months; Chronic Mucocutaneous Candidiasis, often requires maintenance therapy; tinea veriscolor, 2 week of topical application
- Discontinue treatment and consult Physician about diagnosis if no improvement with 2 week of topical application
- Discontinue topical application if sensitive or chemical reaction occurs.
- Administer shampoo as follows: moisten hair and scalp thoroughly with water; apply sufficient shampoo to produce a lather; gently massage for 1 minute; rinse hair with warm water; repeat, leaving on hair for 3 minutes
- Provide hygiene measures to control sources of infection or reinfection
- Provide small, frequent meals if GI (gastrointestinal) upset occurs
- Provide comfort measures appropriate to site of fungal infection
- Arrange hepatic fungal tests prior to therapy and at least monthly during treatment
- Establish safety precautions if CNS (central nervous system) effects occur (side rails, assistance with ambulation)

Drug specific teaching points
- Take the full course of therapy. Long term use of the drug will be needed; beneficial effects may not be seen for several weeks. Take oral drug with meals to decrease GI (gastrointestinal) upset. Apply topical drug to affected area and surrounding area. Shampoo - moisten hair and scalp thoroughly with water; apply to produce a lather; gently massage for 1 minute; rinse with warm water; repeat, leaving on for 3 minutes. Shampoo twice a week for 4 weeks with at least 3 days between shampooing
- Use hygiene measures to prevent reinfection or spread of infection
- Possible side effects: nausea, vomiting, diarrhea (take drug with food); sedation, dizziness, confusion (avoid driving or performing tasks that require alertness); stinging, irritation (local application)
- Report skin rash, severe nausea, vomiting, diarrhea, fever, sore throat, unusual bleeding or bruising, yellowing of the skin or eyes, dark urine or pale stools, severe irritation (local application)
AMPHOTERICIN B
(Antifungal)

Indication: Invasive fungal infections, including Aspergillus and Candida species

Action: Binds to sterols of fungal cell membranes, altering cell permeability and causing cell death.

Adverse Reactions: CNS: Fever, headache, pain
CV: Cardiac arrest, chest pain, hypertension, hypotension
GI: GI (gastrointestinal) hemorrhage, abdominal pain, diarrhea, nausea, vomiting
GU: Renal failure
Hematologic: Leukopenia, thrombocytopenia, anemia
Hepatic: Bilirubinemia
Metabolic: Hypokalemia
Respiratory: Respiratory failure, dyspnea, respiratory disorder
Skin: Rash
Other: Multiple organ failure, chills, sepsis, infection

Dosages: 5 mg/kg daily IV as a single infusion at rate of 2.5 mg/kg/hour, suspension for injection: 100 mg/20 ml vial. Available in 100 mg/20 mg vials.

Nursing Considerations: To prepare, shake vial gently until there is no yellow sediment. Using septic technique, withdraw calculated dose into one or more 20 ml syringes using an 18G needle. More than one vial will be needed.
-Attach a 5 micron filter needle to syringe and inject dose into IV bag of D5W. Volume of D5W should be sufficient to yield 1 mg/ml. One filter needle can be used for up to four vials of Amphotericin B (antifungal) liquid complex.
-For children and patients with CV (cardiovascular) Disease, dilute to 2 mg/ml.
-Do not use an inline filter.
-If infusing through an existing IV line, flush first with D5W.
-Use an infusion pump, and give by continuous infusion at 2.5 mg/kg/hour.
-If infusion time exceeds 2 hours, mix contents by shaking infusion bag every 2 hours. Monitor vital signs closely. Fever, shaking chills, and hypotension may appear within 2 hours of
starting infusion. Slowing infusion rate may decrease risk of infusion related reactions.

- If severe respiratory distress occurs, stop infusion, provide supportive therapy for anaphylaxis, and notify Physician. Do not restart drug.

- Reconstituted drug is stable up to 48 hours if refrigerated (36 - 46 degrees F or 2 - 8 degrees C) and up to 6 hours at room temperature. Electrolytes, other IV drugs, saline solutions are incompatible with Amphotericin (antifungal).

- Antineoplastics may increase risk of renal toxicity, bronchospasm, and hypotension. Use together cautiously.

- Cardiac glycosides may increase risk of Digitalis (heart medication) toxicity from Amphotericin B (antifungal) - induced hypokalemia. Monitor patient closely.

- Clotrimazole (Lotrimun), Fluconazole (Diflucan), Itraconazole (Sporonox), Ketoconazole (Nizoral), Miconazole (Monistat) all antifungals, may counteract Amphotericin B (antifungal). Monitor patient closely.

- Corticosteroids, Corticotropin (steroid - inflammation) may enhance hypokalemia, which could lead to cardiac toxicity. Monitor electrolyte level and cardiac function.

- Cyclosporine (Neoral - an antibiotic) may increase renal toxicity. Monitor renal function test results closely.

- Flucytosine (Ancobon - antifungal) may increase risk of Flucytosine (antifungal) toxicity from increased cellular uptake or impaired renal excretion. Use together cautiously.

- Leukocyte transfusions may increase risk of pulmonary reactions, such as acute dyspnea, tachypnea, hypoxemia, hemoptysis, and interstitial infiltrates. Use together with caution; separate doses as much as possible, and monitor pulmonary function.

- Nephrotoxic drugs (such as Aminoglycosides, Pentamidine (Pentam - antiinfective) may increase risk of renal toxicity. Use together cautiously and monitor renal function closely.

- Skeletal muscle relaxants may enhance skeletal muscle relaxant effects of Amphotericin B (antifungal) induced hypokalemia. Monitor potassium level closely.

- Zidovudine (Retrovir - antiretroviral) may increase myelotoxicity and nephrotoxicity. Monitor renal and hematologic
function.
- May increase alkaline phosphatase, ALT, AST, bilirubin, creatinine, GGT, and LDH levels. May decrease hemoglobin and potassium levels.
- May decrease platelet and WBC counts.
- Contraindicated in patients hypersensitive to Amphotericin B (antifungal) or its components.
- Use cautiously in patients with renal impairment.

Adjust dosage based on patient's overall condition. Renal toxicity is more common at higher dosages.
- Different Amphotericin B (antifungal) preparations are not interchangeable, so dosages will vary. Confusing the preparations may cause permanent damage or death.
- Premedicate patient with Acetaminophen (Tylenol), Antihistamines, or Corticosteroids to prevent or lessen severity of infusion related reactions such as fever, chills, nausea, and vomiting, which occur 1 to 2 hours after start of infusion.
- Hydrate before infusion to reduce risk of nephrotoxicity.
- Monitor creatinine and electrolyte levels (especially magnesium and potassium), liver function, and CBC during therapy.
- Inform patient that he may develop fever, chills, nausea, and vomiting during infusion, but that they usually subside with subsequent doses.
- Instruct patient to report any redness or pain at infusion site.
- Teach patient to recognize and report to Physician signs and symptoms of acute hypersensitivity such as respiratory distress.
- Warn patient that therapy may take several months.
- Tell patient to expect frequent laboratory testing to monitor kidney and liver function.
DIFLUCAN/FLUCONAZOLE
(Antifungal)

Indication: Oropharyngeal Candidiasis, Esophageal Candidiasis, Vulvovaginal Candidiasis, Systemic Candidiasis, Cryptococcal Meningitis, to prevent Candidiasis in bone marrow transplant, to suppress relapse of Cryptococcal Meningitis in patients with AIDS

Action: Inhibits fungal cytochrome P450 (responsible for fungal sterol synthesis); weakens fungal cell walls

Adverse Reactions: CNS: Headache, dizziness
GI: Nausea, vomiting, abdominal pain, diarrhea, dyspepsia, taste perversion
Hematologic: Leukopenia, thrombocytopenia
Skin: Rash
Other: Anaphylaxis

Dosages: 6 mg/kg orally or IV on first day, then 3 mg/kg daily for 2 weeks for children. 200 mg orally or IV on first day, then 100 mg once daily for at least 2 weeks for adults. Each indication dosages vary. Available forms include injection: 200 mg/100 ml, 400 mg/200 ml; powder for oral suspension: 10 mg/ml, 40 mg/ml; tablets: 50 mg, 100 mg, 150 mg, and 200 mg. Oral route peaks in 1 - 2 hours and duration is 30 hours. IV route has an immediate onset and immediate peak.

Nursing Considerations: To ensure product sterility, do not remove protective wrap from IV bag until just before use.
-The plastic container may show some opacity from moisture absorbed during sterilization. This does not affect drug and diminishes over time.
-To prevent air embolism, do not connect in series with other infusions.
-Use an infusion pump.
-Give by continuous infusion at no more than 200 mg/hour.
-Alprazolam (Xanax - anxiety), Chlordiazepoxide (Librium - antianxiety, not used much any longer), Clonazepam (Klonopin - anticonvulsant), Clorazepate (Tranxene - anticonvulsant/antianxiety), Diazepam (Valium - anticonvulsant,
anxiety), Estazolam (Prosom - insomnia), Flurazepam (Dalmame - sedative), Midazolam, (Versed - conscious sedation for many procedures, sedative/hypnotic), Quazepam (Doral - to treat insomnia), Triazolam (Halcion - sedative), may increase and prolong levels of these drugs, CNS (central nervous system) depression, and psychomotor impairment. Avoid using together.

- Cimetidine (Tagamet - stomach) may decrease Diflucan (antifungal) level. Monitor patient's response to Diflucan (antifungal).

- Cyclosporine (Neoral - an immunosuppressant), Phenytoin, (Dilantin - anticonvulsant), Theophylline (a bronchodilator) may increase levels of these drugs. Monitor these drugs levels.

- HMG-CoA reductase inhibitors (Atorvastatin (Lipitor), Fluvastatin (Lescol), Lovastatin (Mevacor), Pravatatin, (Pravachol), Simvastatin (Zocor), all to lower cholesterol, may increase levels and adverse effects of these drugs. Avoid using together or reduce dosage of HMG-CoA reductase inhibitor.

- Isoniazid (an antitubucular), oral Sulfonylureas, Phenytoin, (Dilantin - anticonvulsant), Rifampin (an antitubucular), Valporic Acid (Depakote - anticonvulsant), may increase hepatic transaminase level. Monitor liver function test results closely.

- Oral Sulfonylureas (such as Glipizide (Glucotrol), Glyburide, (Micronase), Tolbutamide (all hypoglycemics to lower sugar levels), may increase levels of these drugs. Monitor patient for enhanced hypoglycemic effect.

- Rifampin (an antitubucular) may enhance Diflucan (antifungal) metabolism. Monitor patient for lack of response to Diflucan (antifungal).

- Tacrolimus (Prograf - immunosuppressant), may increase Tacrolimus (Prograf - immunosuppressant) level and nephrotoxicity. Monitor patient carefully.

- Warfarin (Coumadin - blood thinner) may increase risk of bleeding. Monitor PT and INR.

- Zidovudine (Retrovir - an antiretroviral) may increase Zidovudine (Retrovir - antiretroviral) activity. Monitor patient closely.

- May increase alkaline phosphatase, ALT, AST, bilirubin, and GGT levels.
- May decrease platelet and WBC counts.
- Contraindicated in patients hypersensitive to drug.
- Use cautiously in patients hypersensitive to other antifungal azole compounds.
- Serious hepatotoxicity has occurred in patients with underlying medical conditions.
- If patient develops mild rash, monitor him closely. Stop drug if lesions progress.
- Likelihood of adverse reactions may be greater in HIV infected patients.
- Tell patient to take drug as directed, even after he feels better.
- Instruct patient to report adverse reactions promptly.
LAMISIL/TERBINAFINE HYDROCHLORIDE
(Antifungal)

Indication: Fingernail Onychomycosis caused by Dermatophytes (Tinea Unguium) and toenail Onychomycosis caused by Dermatophytes (Tinea Unguium)

Action: Inhibits squalene epixidase, a key enzyme in sterol biosynthesis of fungi, leading to ergosterol deficiency and a corresponding accumulation of sterol within the fungal cell

Adverse Reactions: CNS: Headache
EENT: Visual disturbances
GI: Taste disturbances, diarrhea, dyspepsia, abdominal pain, nausea, flatulence
Hematologic: Neutropenia
Hepatic: Hepatobiliary dysfunction, including cholestatic jaundice
Skin: Stevens Johnson Syndrome, toxic epidermal necrolysis, rash, pruritus, urticaria
Other: Anaphylaxis, hypersensitivity reactions

Dosages: 250 mg oral once daily for 6 weeks. Available form 250 mg. It peaks in 2 hours.

Nursing Considerations: Caffeine may decrease IV caffeine clearance. Use cautiously together.
- Cimetidine (Tagamet - stomach) may decrease clearance of Lamisil (antifungal) by one third. Avoid using together.
- Cyclosporine (Neoral - an immunosuppressant) may increase Cyclosporine (Neoral - immunosuppressant) clearance. Monitor Cyclosporine (immunosuppressant) level.
- May increase AST and ALT levels.
- May decrease neutrophil and lymphocyte counts.
- Contraindicated in patients hypersensitive to drug, those with liver disease, and those with creatinine clearance less than 50 ml/minute.
- Rarely, patients with or without liver disease may suffer life-threatening liver failure.
- Obtain pretreatment transaminase levels for all patients taking drug.
Tablets are not recommended for patients with acute or chronic
liver disease.

- Monitor CBC and hepatic enzyme levels in patients receiving drug for longer than 6 weeks. Stop drug if hepatobiliary dysfunction or cholestatic hepatitis develops.

- Do not confuse Terbinafine (Lamisil - antifungal) with Terbutaline (Brethine - a bronchodilator) or Lamisil (antifungal) with Lamictal (anticonvulsant).

- Inform patient that successful treatment may take 10 weeks for toenail infections and 4 weeks for fingernail infections.

- Tell patient to report visual disturbances immediately; changes in the ocular lens and retina may occur. Patient should also immediately report persistent nausea, anorexia, fatigue, vomiting, right upper quadrant pain, jaundice, dark urine, or pale stools.

- Lovastatin (Mevocor), Pravatatin (Pravachol), Simvastatin (Zocor), all lower cholesterol, may increase levels and adverse effects of these drugs. Avoid using together or reduce dosage of HMG-CoA reductase inhibitor.

- Isoniazid (an antitubucular), oral Sulfonylureas, Phenytoin (Dilantin - anticonvulsant), Rifampin (an antitubucular), Valporic Acid (Depakote - anticonvulsant), may increase hepatic transaminase level. Monitor liver function test results closely.

- Oral Sulfonylureas (such as Glipizide (Glucotrol), Glyburide, Micronase), Tolbutamide (a hypoglycemic), all to lower sugar level, may increase levels of these drugs. Monitor patient for enhanced hypoglycemic effect.

- Rifampin (an antitubucular) may enhance Diflucan (antifungal) metabolism. Monitor patient for lack of response to Diflucan (antifungal).

- Tacrolimus (Prograf - immunosuppressant) may increase Tacrolimus (Prograf - immunosuppressant) level and nephrotoxicity. Monitor patient carefully.

- Warfarin (Coumadin - blood thinner) may increase risk of bleeding. Monitor PT and INR.
MYCOSTATIN/NYSTATIN
(Antifungal)

Indication: Intestinal Candidiasis, Oral Candidiasis (Thrush), and Vaginal Candidiasis

Action: Probably binds to sterols in fungal cell membrane, altering cell permeability and allowing leakage of intracellular components

Adverse Reactions: GI: Transient nausea, vomiting, diarrhea
GU: Irritation, sensitization, vulvovaginal burning (vaginal form)
Skin: Rash

Dosages: 400,000 units to 600,000 units orally as oral suspension four times a day or 200,000 units to 400,000 unit oral as lozenges 4 to 5 times a day for up to 14 days for children or adults. For infants, 200,000 units oral as oral suspension fours times a day. Neonates and premature infants, 100,000 units oral suspension four times a day. Available forms are lozenges: 200,000 units; oral suspension - 100,000 units/ml; powder 50 million, 150 million, or 500 million units, 1 billion, 2 billion, or 5 billion units; tablets - 500,000 units; vaginal tablets - 100,000 units.

Nursing Considerations: Contraindicated in patients hypersensitive to drug.
- Drug is not effective against systemic infections.
- To treat oral candidiasis, after the patient’s mouth is clean of food debris, have him hold suspension in mouth for several minutes before swallowing. When treating infants, swab medication on oral mucosa. Physician may instruct immunosuppressed patients to suck on vaginal tablets (100,000 units) because this provides prolonged contact with oral mucosa.
- Instruct patient not to chew or swallow lozenge but to allow it to dissolve slowly in mouth.
- Advise patient to continue taking drug for at least 2 days after signs and symptoms disappear. Consult Physician for exact length of therapy.
- Instruct patient to continue therapy during menstruation.
- Explain that factors predisposing women to vaginal infection include use of Antibiotics, Corticosteroids, Diabetes, tight-fitting pantyhose. Encourage women to wear cotton underwear.
- Instruct women in careful hygiene for affected areas, including...
cleaning perineal area from front to back.
- Advise patient to report redness, swelling, or irritation.
- Tell patient, especially an older patient, that overusing mouthwash, or wearing poorly fitting dentures may promote infection.
NIZORAL/KETOCONAZOLE
(Antifungal)

Indication: Systemic Candidiasis, Chronic Mucocutaneous Candidiasis, Oral Candidiasis, Candiduria, Coccidioidomycosis, Blastomycosis, Histoplasmosis, Chromomycosis, and Paracoccidioidomycosis; severe cutaneous Dermatophyte infections that are resistant to therapy with topical or oral Griseofulvin (Grifulvin - antibiotic). Also for Onychomycosis and Tinea capitis

Action: Interferes with fungal cell wall synthesis by inhibiting formation of ergosterol and increasing cell wall permeability that makes the fungus susceptible to osmotic instability.

Adverse Reactions: CNS: Suicidal tendencies, fever, headaches, nervousness, dizziness, somnolence, severe depression
EENT: Photophobia
GI: Nausea, vomiting, abdominal pain, diarrhea
Hematologic: Leukopenia, thrombocytopenia, hemolytic anemia
Hepatic: Fatal hepatotoxicity
Metabolic: Hyperlipidemia
Skin: Pruritus
Other: Gynecomastia, chills

Dosages: 200 mg daily initially in a single dose. May increase to 400 mg once daily for those who do not respond to treatment. (These dosages apply to those who weigh more than 40 kg or 88 lb). For children age 2 or older, 3.3 mg to 6.6 mg/kg/ orally daily in a single dose. Available forms include oral suspension: 100 mg/5 ml; and tablets: 200 mg. Peak time is 1 – 2 hours.

Nursing Considerations: Alprazolam (Xanax - anxiety), Triazolam (Halcion – sedative) may increase and prolong levels of these drugs. May cause CNS (central nervous system) depression and psychomotor impairment. Avoid using together.
-Antacids, Anticholinergics, H2 receptor antagonists may decrease absorption of Nizoral (antifungal). Wait at least 2 hours after Nizoral (antifungal) dose before giving these drugs.
-Chlor Diazepoxide (Librium - anxiety, not used very much any longer), Clonazepam (Klonopin - anticonvulsant), Clorazepate, (Tranxene - anticonvulsant/antianxiety), Diazepam (Valium - anticonvulsant/anxiety), Estazolam (Prosom - insomnia),
Flurazepam (Dalmane - sedative), Midazolam (Versed - conscious sedation for procedures/sedative/hypnotic), Quazepam (Doral - insomnia) may increase and prolong levels of these drugs. May cause CNS (central nervous system) depression and psychomotor impairment. Avoid using together.

- Cyclosporine (Neoral - an immunosuppressant), Methylprednisolone (Medrol - antiinflammatory), Tacrolimus (Prograf - immunosuppressant), may increase drug levels. Monitor drug levels, if appropriate.

- Digoxin (heart) level may be increased. Monitor level.

- Oral Antidiabetics may cause hypoglycemia. Monitor glucose level.

- Phenytoin (Dilantin - anticonvulsant) may alter the metabolism of one or both drugs. Monitor patient for adverse effects.

- Theophylline (bronchodilator) level may be decreased. Monitor level.

- Warfarin (Coumadin - blood thinner) may enhance effects of anticoagulant. Monitor INR, PT, and PTT and adjust dosage as needed.

- May increase lipid, alkaline phosphatase, ALT, and AST levels. May decrease hemoglobin level.

- Contraindicated in patients hypersensitive to drug and in those taking Alprazolam (Xanax - anxiety) or oral Triazolam (Halcion - sedative).

- Use cautiously in patients with hepatic disease and in those taking other hepatotoxic drugs.

- Because of risk of hepatotoxicity drug should not be used for less serious conditions, such as fungal infections of skin or nails.

- Monitor patient for signs and symptoms of hepatotoxicity, including elevated liver enzyme levels, nausea that does not subside, and unusual fatigue, jaundice, dark urine, or pale stool.

- Doses up to 800 mg/day can be used to treat Fungal Meningitis and Intracerebral Fungal Lesions.

- Drug is a potent inhibitor of the cytochrome P450 enzyme system. Giving this drug with drugs metabolized by the cytochrome P450 3A4 enzyme system may lead to increased drug levels, which could increase or prolong therapeutic and adverse effects.
- Instruct patient with Achlorhydria (a lack of hydrochloric acid in the digestive juices in the stomach) to dissolve each tablet in 4 ml aqueous solution of 0.2 hydrochloric acid, sip mixture through a glass or plastic straw, and then drink a glass of water because drug needs gastric acidity for dissolution and absorption.
- Instruct patient to wait at least 2 hours after dose before taking Antacids.
- Make sure patient understands that treatment should continue until all tests indicate that active fungal infection has subsided. If drug is stopped too soon, infection will recur. Minimum treatment for candidiasis is 7 to 14 days; for other systemic fungal infections, 6 months; for resistant dermatophyte, at least 4 weeks.
- Reassure patient that nausea is common early in therapy, but will subside. To minimize nausea, instruct patient to divide daily amount into 2 doses or take drug with meals.
- Review signs and symptoms of hepatotoxicity with patient. Instruct him to stop drug and notify Physician if they occur.
- Advise patient to discuss any new drugs or herbal supplements with Physician.
**SPORANOX/ITRACONAZOLE**

*(Antifungal)*

**Indication:** Pulmonary and extrapulmonary Blastomycosis, Nonmeningeal Histoplasmosis, Aspergillosis, Onychomycosis of the toenail or fingernail, Oropharyngeal Candidiasis and/or those unresponsive to Diflucan therapy, Esophageal Candidiasis

**Action:** Interferes with fungal cell wall synthesis by inhibiting ergosterol formation and increasing cell wall permeability, leading to osmotic instability

**Adverse Reactions:**
- **CNS:** Headache, fever, dizziness, somnolence, fatigue, malaise, asthenia, pain, tremor, abnormal dreams, anxiety, depression
- **CV:** Heart failure, hypertension, edema, orthostatic hypotension
- **EENT:** Rhinitis, sinusitis, pharyngitis
- **GI:** Nausea, vomiting, diarrhea, abdominal pain, anorexia, dyspepsia, flatulence, increased appetite, constipation, gastritis, gastroenteritis, ulcerative stomatitis, gingivitis
- **GU:** Albuminuria, cystitis, UTI (urinary tract infection)
- **Hematologic:** Neutropenia
- **Hepatic:** Hepatotoxicity, liver failure, impaired liver function
- **Metabolic:** Hypokalemic, hypertriglyceridemia
- **Musculoskeletal:** Myalgia
- **Respiratory:** Pulmonary edema, upper respiratory tract infection
- **Skin:** Rash, pruritus
- **Other:** Injury, Herpes Zoster, hypersensitivity reactions (urticaria, angioedema, Stevens Johnson Syndrome)

**Dosages:**
- 200 mg daily: increase as needed and tolerated by 100 mg to maximum of 400 mg daily. Give dosages exceeding 200 mg daily in two divided doses. Continue treatment for at least three months. Again, for each indication there are different dosages. Available in 100 mg capsules or oral solution of 10 mg/ml. Peak level in 3 - 4 hours after ingestion.

**Nursing Considerations:** Alprazolam (Xanax - anxiety), Midazolam (Versed - conscious sedation for procedures/sedation/hypnotic), Triazolam (Halcion - sedative) may increase and prolong drug
levels, CNS (central nervous system) depression, and psychomotor impairment. Avoid using together.

-Antacids, Carbamazepine (Tegretol - anticonvulsant), H2-Receptors Antagonists, Isoniazid (antitubercular), Phenobarbital (anticonvulsant/sedative), Phenytoin (Dilantin - anticonvulsant), may decrease Sporanox (antifungal) level. Avoid using together.

-Chlordiazepoxide (Librium - anxiety/not used very much any longer), Clonazepam (Klonopin - anticonvulsant), Clorazepate (Tranxene - anticonvulsant), Diazepam (Valium - anticonvulsant/ anxiety), Estazolam (ProSom - insomnia), Flurazepam (Dalmane - sedative), Quazepam (Dorol - insomnia) may increase and prolong drug levels, CNS (central nervous system) depression and psychomotor impairment. Avoid using together.

-Clarithromycin (Biaxin), Erythromycin (both are antiinfectives) may increase Sporanox (antifungal) levels. Monitor patient for signs of Sporanox (antifungal) toxicity.

-Cyclosporine (Neoral - an immunosuppressant), Digoxin (heart), Tacrolimus (Prograf - an immunosuppressant), may increase levels of these drugs. Monitor drug levels.

-Oral anticoagulants may enhance anticoagulant effect. Monitor PT and INR.

-Oral antidiabetics may cause hypoglycemia, similar to other antifungals. Monitor glucose level. Avoid using together.

-Grapefruit and orange juice may decrease drug level and therapeutic effect. Give with other liquids.

-May increase alkaline phosphatase, ALT, AST, bilirubin, triglyceride, and GGT levels. May decrease potassium level.

-Contraindicated in patients hypersensitive to drug or in those receiving Alprazolam (Xanax - anxiety), Trizolam (Halcion - sedative), Midazolam (Versed - conscious sedation/sedation/hypnotic), Pimozone (Orap - antipsychotic), Quinidine (heart), (Dofetilide (antiarrhythmic), Lovastatin (Mevacor - high cholesterol), or Simvastatin (Zocor - high cholesterol); in those with ventricular dysfunction or a history of heart failure (stop the drug).

-Use cautiously in patients with hypochlorhydria (insufficient
stomach acid) - they may not absorb drug readily.
-Capsules and oral solutions are not interchangeable.
-Perform baseline liver function testing and monitor results periodically. In patients with baseline hepatic impairment, give drug only if patient’s condition is life threatening. If liver dysfunction occurs during therapy, notify Doctor immediately.
-Teach patient to recognize and report signs and symptoms of liver disease (anorexia, dark urine, pale stools, unusual fatigue, and jaundice).
-For the oral solution, tell patient to take 10 ml at a time.
-Advise patient to take solution without food and to take capsules with a full meal.
-Urge patient to list the other drugs he is taking for the Doctor to avoid drug interactions.
ANTIPARKINSONIAN DRUGS/ALZHEIMER'S

Definition
Antiparkinson drugs are medicines that relieve the symptoms of Parkinson's Disease and other forms of parkinsonism.

Purpose
Antiparkinson drugs are used to treat symptoms of Parkinsonism, a group of disorders that share four main symptoms: tremor or trembling in the hands, arms, legs, jaw, and face; stiffness or rigidity of the arms, legs, and trunk; slowness of movement (bradykinesia); and poor balance and coordination. Parkinson's Disease is the most common form of Parkinsonism and is seen more frequently with advancing age. Other forms of the disorder may result from viral infections, environmental toxins, carbon monoxide poisoning, and the effects of treatment with Antipsychotic drugs.

The immediate cause of Parkinson's Disease or Parkinsonian like syndrome is the lack of the neurotransmitter Dopamine in the brain. Drug therapy may take several forms, including replacement of Dopamine, inhibition of Dopamine metabolism to increase the effects of the Dopamine already present, or sensitization of Dopamine receptors. Drugs may be used singly or in combination.

Description
Levodopa (Larodopa) is the mainstay of Parkinson's treatment. The drug crosses the blood-brain barrier, and is converted to Dopamine. The drug may be administered alone, or in combination with Carbidopa (Lodosyn) which inhibits the enzyme responsible for the destruction of Levodopa. The limitation of Levodopa or Levodopa/Carbidopa therapy is that after approximately two years of treatment, the drugs cease to work reliably. This has been termed the "on-off phenomenon." Additional treatment strategies have been developed to retard the progression of Parkinsonism, or to find alternative approaches to treatment.

Anticholinergic drugs reduce some of the symptoms of Parkinsonism, and reduce the reuptake of Dopamine, thereby sustaining the activity of the natural neurohormone. They may be effective in all stages of the disease. All drugs with Anticholinergic properties, the naturally occurring Belladonna Alkaloids (Atropine, Scopolamine, Hyoscyamine), some Antihistamines with Anticholinergic Properties, and Synthetics such as Benztropin (Cogentin), Procyclidine (Kemadrin) and Biperiden (Akineton) are members of this group. Although the Anticholinergic
Drugs have only limited activity against Parkinson’s Disease, they are useful in the early stages, and may be adjuncts to Levodopa as the disease progresses.

**Recommended dosage**
Dosages of AntiParkinsonian medications must be highly individualized. All doses must be carefully titrated. Consult specific references

**Precautions**
There are a large number of drugs and drug classes used to treat Parkinson’s Disease, and individual references should be consulted. The Anticholinergics have a large number of adverse effects, all related to their primary mode of activity. Their **cardiovascular effects** include tachycardia, palpitations, hypotension, postural hypotension, and mild bradycardia. They may also cause a wide range of **CNS (central nervous system) effects**, including disorientation, confusion, memory loss, hallucinations, psychoses, agitation, nervousness, delusions, delirium, paranoia, euphoria, excitement, lightheadedness, dizziness, headache, listlessness, depression, drowsiness, weakness, and giddiness. Dry mouth, dry eyes and gastrointestinal distress are common problems. Sedation has been reported with some drugs in this group, but this may be beneficial in patients who suffer from insomnia. Pregnancy risk factor is C. Because Anticholinergic Drugs may inhibit milk production, their use during breastfeeding is not recommended. Patients should be warned that Anticholinergic Medications will inhibit perspiration, and so exercise during periods of high temperature should be avoided. Levodopa has a large number of adverse effects. Anorexia, loss of appetite, occurs in roughly half the patients using this drug. Symptoms of gastrointestinal upset, such as nausea and vomiting, have been reported in 80% of cases. Other **reported effects** include increased hand tremor; headache; dizziness; numbness; weakness and faintness; bruxism; confusion; insomnia; nightmares; hallucinations and delusions; agitation and anxiety; malaise; fatigue and euphoria. Levodopa has not been listed under the pregnancy risk factor schedules, but should be used with caution. Breastfeeding is not recommended.

**Side effects**
The most common side effects are associated with the CNS (central nervous system), and include dizziness, lightheadedness, mood changes and hallucinations. Gastrointestinal problems, including nausea and vomiting, are also common.
Interactions
All AntiParkinsonian regimens should be carefully reviewed for possible drug interactions. Note that combination therapy with AntiParkinsonian drugs is, in itself, use of additive and potentiating interactions between drugs, and so careful dose adjustment is needed whenever a drug is added or withdrawn.
ARICEPT/DONEPEZIL HYDROCHLORIDE
(Alzheimer's dementia)

Indication: Mild to moderate Alzheimer's dementia

Action: Thought to increase acetylcholine concentration by inhibiting the cholinesterase enzyme, which causes hydrolysis of acetylcholine. May improve cognitive function in patients with Alzheimer's Disease

Adverse Reactions: CNS: Headache, insomnia, dizziness, fatigue, depression, abnormal dreams, somnolence, seizures, tremors, irritability, paresthesia aggression, vertigo, ataxia, restlessness, abnormal crying, nervousness, aphasia, syncope, pain

CV: Chest pain, hypertension, vasodilatation, atrial fibrillation, hot flashes, hypotension

EENT: Cataract, blurred vision, eye irritation, sore throat

GI: Nausea, vomiting, diarrhea, anorexia, fecal incontinence, GI (gastrointestinal) bleeding, bloating, epigastric pain

GU: Urinary frequency

Metabolic: Weight loss, dehydration

Musculoskeletal: Muscle cramps, arthritis, bone fracture

Respiratory: Dyspnea, bronchitis

Skin: Pruritus, urticaria, diaphoresis, ecchymosis

Other: Toothache, influenza

Dosages: 5 mg daily at bedtime, initially. After 4 - 6 weeks, increase to 10 mg daily. Available forms oral disintegrating tablets (ODT's) 5 mg and 10 mg: tablets 5 mg and 10 mg. Peak time is 1 - 2 hours.

Nursing Considerations: May cause anticholinergics to decrease Aricept effects. Avoid using together.

- Carbamazepine (Tegretol - an anticonvulsant), Phenobarbital (anticonvulsant/sedative), Dilantin (anticonvulsant), Dexamethasone (Decadron - steroid) may increase rate of Aricept (antiparkinson) elimination. Monitor patient.

- Contraindicated in patients hypersensitive to drug.

- Use cautiously in those who take NSAIDS (Nonsteroidal anti inflammatory drugs - like Ibuprofen) or have CV (cardiovascular) Disease, Asthma, Obstructive Pulmonary Disease, urinary outflow impairment, or history of Ulcer Disease.

- Monitor patient for evidence of active or GI (gastrointestinal)
bleeding.
-Do Not confuse Aricept (antiparkinson) with Ascriptin (Aspirin - ASA and Maalox drug).
-Stress that drug does not alter underlying degenerative disease but can temporarily stabilize or relieve symptoms. Effectiveness depends on taking drug at regular intervals.
-Tell caregiver to give drug just before patient's bedtime.
-Advise patient and caregiver to immediately report significant adverse effects or changes in overall health status and to inform health care team that patient is taking drug before he receives anesthesia.
-Tell patient to avoid OTC (over the counter) cold and sleep remedies because of risk of increased anticholinergic effects.
COGENTIN/BENZTROPINE MESYLATE  
(Antiparkinsonian)

Indication: Drug induced extrapyramidal disorders (except Tardive Dyskinesia), Acute Dystonia Reaction, and Parkinsonism

Action: Unknown. May block central cholinergic receptors, helping to balance cholinergic activity in the basal ganglia

Adverse Reactions: 
CNS: Confusion, memory impairment, nervousness, depression, disorientation, hallucinations, toxic psychosis
CV: Tachycardia
EENT: Dilated pupils, blurred vision
GI: Dry mouth, constipation, nausea, vomiting, paralytic ileus
GU: Urine retention, dysuria
Skin: Decreased sweating

Dosages: 0.5 mg - 6 mg orally or injection once or twice daily. Available in 0.5 mg, 1 mg, or 2 mg tablets or in 1 mg/ml in 2 ml ampules. Oral onset is in 1 - 2 hours with a duration of 24 hours. The IM (injection) route has an onset in 15 minutes with a duration of 24 hours.

Nursing Considerations: Contraindicated in patients hypersensitive to drug or its components, in those with glaucoma, and in children younger than 3.
-Use cautiously in hot weather, in patients with mental disorders, and in children 3 and older, and in those with seizure disorders.
-Monitor vital signs carefully. Watch closely for adverse reactions, especially in debilitated patients. Call your Physician if adverse reactions occur.
-Some adverse reactions are dose related and may be caused by atropine-like toxicity. It may aggravate Tardive Dyskinesia.
-Watch for intermittent constipation and abdominal distention and pain, which may indicate onset of paralytic ileus.
-Warn patient to avoid activities that require alertness until CNS (central nervous system) effects of drug are known.
-If patient takes a single dose daily, tell him to do so at bedtime.
-Advise patients to report signs and symptoms of urinary hesitancy or urine retention.
-Tell patient to relieve dry mouth with cool drinks, ice chips,
sugarless gum, or hard candy.
- Advise patient to limit hot weather activities because drug-induced lack of sweating may cause overheating.
EXELON/RIVASTIGMINE TARTRATE
(Central Nervous System Drug)

Indication: Symptomatic treatment of patients with mild to moderate Alzheimer's Disease

Action: Thought to increase acetylcholine concentration by reversibly inhibiting the cholinesterase enzyme, which causes hydrolysis of acetylcholine. This may result in some memory improvement

Adverse Reactions: CNS: Syncope, fatigue, asthenia, malaise, dizziness, headache, somnolence, tremor, insomnia, confusion, depression, anxiety, vertigo, agitation, nervousness, delusion, paranoid reaction
CV: Hypertension, chest pain, peripheral edema
EENT: Rhinitis, pharyngitis
GI: Nausea, vomiting, diarrhea, anorexia, abdominal pain, dyspepsia, constipation, flatulence, eructation
GU: UTI (urinary tract infection), urinary incontinence
Metabolic: Weight loss
Musculoskeletal: Back pain, arthralgia, bone fracture
Respiratory: Upper respiratory tract infection, cough, bronchitis
Skin: Increased sweating, rash
Other: Accidental trauma, flulike symptoms, pain

Dosages: 1.5 mg twice daily with food initially. If tolerated, may increase to 3 mg twice daily after 2 weeks. Following 2 weeks at this dose, may increase to 4.5 mg twice daily and 6 mg twice daily. As tolerated, effective dosage range is 6 mg to 12 mg daily; maximum, 12 mg daily. Capsules available in 1.5 mg, 3 mg, 4.5 mg, and 6 mg. Peak of Exelon is 1 hour and duration is 12 hours.

Nursing Considerations: Neuromuscular blocking drugs or Cholinergic Antagonists (Bethanechol - Urecholine - urinary), (Succinylcholine - Anectine - an adjunct to anesthesia) may have synergistic effect. Monitor patient closely.
- Smoking may increase Exelon's (antialzheimer's) clearance. Discourage use together.
- Contraindicated in patients hypersensitive to drug, other Carbamate derivatives, or other components of the drug.
- Expect significant GI (gastrointestinal) adverse effects (such as nausea, vomiting, anorexia, and weight loss). These effects
are less common during maintenance doses.

- Monitor patient for evidence of active or occult GI (gastrointestinal) bleeding.

- Dramatic memory improvement is unlikely. As disease progresses, the benefits of Exelon (antialzheimer's) may decline.

- Monitor patient for severe nausea, vomiting and diarrhea, which may lead to dehydration and weight loss.

- Carefully monitor patient with a history of GI (gastrointestinal bleeding, NSAID (Nonsteroidal Antiinflammatory Drugs - like Ibuprofen) use, Arrhythmias, Seizures, or pulmonary conditions for adverse effects.

- Tell caregiver to give Exelon (antialzheimer's) with food in the morning and evening.

- Advise patient that memory improvement may be subtle and that drug more likely slows memory loss.

- Tell patient to report nausea, vomiting, or diarrhea.

- Tell patient to consult his Physician before using OTC (over the counter) medications.
MIRAPEX/PRAMIPEXOLE DIHYDROCHLORIDE
(Antiparkinsonian)

Indication: Signs and symptoms of idiopathic Parkinson's Disease
Action: Unknown. May directly stimulate post synaptic Dopamine
receptors in corpus striatum (unlike Levodopa, which may increase
brain's Dopamine concentration)

Adverse Reactions: CNS: Headache, dizziness, drowsiness, hallucinations,
asthenia, confusion, dyskinesia, insomnia, hypertonia,
unsteadiness, sleep attacks, abnormal dreams, amnesia, dystonia,
extrapyramidal syndrome, gait abnormalities, myoclonus, paranoid
reaction, malaise, thought abnormalities, fever
CV: Orthostatic hypotension, chest pain, peripheral edema
EENT: Rhinitis, epistaxis, abnormal vision, diplopia, eye disorder
GI: Nausea, constipation, dyspepsia, dry mouth, anorexia,
abdominal pain, diarrhea, anorexia, vomiting, taste perversion
GU: Urinary frequency, UTI (urinary tract infection), hematuria
Metabolic: Weight gain
Musculoskeletal: Leg cramps, arthralgia, bursitis, myalgia, chest,
neck, and back pain
Respiratory: Fibrotic complications (such as retroperitoneal
fibrosis, pulmonary infiltrates, pleural effusions or thickening),
dyspnea
Skin: Rash, diaphoresis
Other: Accidental injury, flu syndrome, infection, facial,
peripheral, and generalized edema

Dosages: 0.125 mg three times a day, initially. May increase by 0.125 mg
every 5 - 7 days over 6 - 7 weeks. Maintenance dosage ranges
from 1.5 mg to 4.5 mg/day in three divided doses. Available
forms is tablets in 0.125 mg, 0.25 mg, 0.5 mg, 1 mg, and 1.5 mg.
Peak of drug is in 2 hours and its duration is 8 - 12 hours.

Nursing Considerations: Hypersensitivity to drug or its components.
-Use cautiously in patients with renal impairment, the elderly and
in children.
-Do Not give at same time as other CNS (central nervous system)
Depressants.
-Do Not stop therapy abruptly. Taper dosage over 1 week.
-Cimetidine (Tagamet - stomach) increases Mirapex's
(antiparkinson) blood level.

- Dopamine antagonists decreased Mirapex’s (antiparkinson) efficacy.
- Levodopa (Dopamine - to increase blood pressure) increased the risk of hallucinations and dyskinesia.
- Evaluate patient for therapeutic and adverse effects.
- Assess blood pressure, watch for an orthostatic hypotension.
- Monitor neurologic status, especially for sleep attacks and extrapyramidal symptoms.
- Watch closely for pulmonary complications.

- Instruct patient to take drug with food if it causes nausea. Tell him not to take at the same time as other CNS (central nervous system) Depressants.
- Advise patient to report respiratory problems, dyskinesia, hallucinations, and sleep attacks.
- Inform patient and family that drug’s neurologic and motor effects increase risk of accidental injury. Teach them ways to prevent injury.
- Tell patient to move slowly when sitting up or standing, to avoid dizziness from sudden blood pressure decrease.
- As appropriate, review all other significant and life threatening adverse reactions and interactions, especially those related to the drugs mentioned above.
NAMENDA/MEMANTINE HYDROCHLORIDE
(Central nervous system drug)

Indication: Moderate to severe dementia of the Alzheimer’s type

Action: Antagonizes N methyl D aspartate (NMDA) receptors, the persistent activation of which seems to increase Alzheimer’s symptoms

Adverse Reactions: CNS: Aggressiveness, agitation, anxiety, ataxia, confusion, CVA (cerebral vascular accident/stroke), depression, dizziness, fatigue, hallucinations, headache, hypokinesia, insomnia, pain, somnolence, syncope, transient ischemic attack, vertigo.
CV: Edema, heart failure, hypertension
EENT: Cataracts, conjunctivitis
GI: Anorexia, constipation, diarrhea, nausea, vomiting
GU: Incontinence, urinary frequency, UTI (urinary tract infection)
Hematologic: Anemia
Metabolic: Weight loss
Musculoskeletal: Arthralgia, back pain
Respiratory: Bronchitis, coughing, dyspnea, flulike symptoms, pneumonia, upper respiratory tract infection
Skin: Rash
Other: Abnormal gait, falls, injury

Dosages: 5 mg once daily initially. Increase by 5 mg/day every week until target dose is reached. Maximum dose, 10 mg twice a day. Doses greater than 5 mg should be divided twice a day. Reduce dosage in patients with moderate renal impairment. Available forms: oral solution 2 mg/ml; tablets 5 mg and 10 mg. Oral peak time is 3 - 7 hours.

Nursing Considerations: Cimetidine (Tagamet - stomach), Hydrochlorothiazide (Oretic - diuretic), Quinidine - (heart), Ranitidine (Zantac - stomach), Triametene (Dyrenium - diuretic) may alter levels of Namenda (antialzheimer's). Monitor patient.
-NMDA antagonists (Amantadine - Symmetrel - antiparkinsonian), (Dextromethorphan - Robitussin - antitussive), Ketamine - anesthetic). Use together cautiously.
-Urine alkalinizers (Carbon anhydrase inhibitors, Sodium Bicarbonate (alkalinizer - buffer in the acid-base system) may
decrease Namenda (antialzheimer's) clearance. Monitor patient for adverse effects.
- Herbs that alkalinize urine may increase drug level and adverse effects. Use together cautiously.
- Foods that alkalinize urine may increase drug level and adverse effects. Use together cautiously.
- Alcohol and smoking may alter drug adherence, decrease its' effectiveness, or increase adverse effects. Discourage use together.
- May increase alkaline phosphatase level.
- May decrease hemoglobin and hemacrit.
- Contraindicated in patients allergic to drug or its' components.
- Not recommended for patients with severe renal impairment.
- Use cautiously in patients with seizures, hepatic impairment, or moderate renal impairment.
- Use cautiously in patients who may have an increased urine pH (from drugs, diet, renal tubular acidosis, or severe UTI (urinary tract infection), for example).
- Namenda is not indicated for patients with mild Alzheimer's disease or other types of dementia.
- Explain that Namenda does not cure Alzheimer's disease, but may improve the symptoms.
- Tell patient to report symptoms.
- To avoid possible interactions, advise patient not to take herbal or OTC (over the counter) products without consulting their Physician.
PARLODEL/BROMOCRIPTINE MESYLATE
(Antiparkinsonian)

Indications: For Parkinson Disease, may be effective in combination with other drugs when the beginning of deterioration starts as in Batten Disease, acromegaly, Neuroleptic Malignant Syndrome

Action: Inhibits secretion of prolactin and acts as a Dopamine receptor antagonist by activating post synaptic Dopamine receptors

Adverse Reactions: CNS: Dizziness, headache, fatigue, seizures, stroke, mania, delusions, light headedness, drowsiness, delusions, nervousness, insomnia, depression
Cardiovascular: Hypotension, acute MI (myocardial infarction/heart attack)
EENT: Nasal congestion, blurred vision
GI: Nausea, abdominal cramps, constipation, diarrhea, vomiting, anorexia
GU: Urine retention, urinary frequency
Skin: Coolness and pallor of fingers and toes

Dosages: Start with 1.25 mg - 2.5 mg twice daily, increase dosage by 2.5 mg daily every 14 - 28 days until desired effect is achieved up to 100 mg/day. Available forms are: capsules 5 mg; tablets 2.5 mg. The oral route has an onset of 2 hours with a peak of 8 hours and a duration of 24 hours.

Nursing Considerations: Amitriptyline (Elavil - antidepressant), Haloperidol (Haldol - antipsychotic), Imipramine (Tofranil - tricyclic antidepressant), Loxapine (antipsychotic), MAO (Monoamine Oxidase) Inhibitors, Methyldopa (Dopamet - antihypertensive), Metoclopramide (Reglan - antiemetic/Dopamine antagonist), Phenothiazines, Reserpine (antihypertensive) may interfere with Parlodel's (antiparkinson) effects. Parlodel's (antiparkinson) dosage may need to be increased.

-Antihypertensives may increase hypotensive effects. Adjust dosage of antihypertensive.
-Estrogens (hormones), Hormonal Contraceptives, Progestins may interfere with effects of Parlodel (antiparkinson). Avoid using together.
-Levodopa (Parkinson Disease) may have additive effects. Adjust dosage of Levodopa (antiparkinson), if needed.
- Alcohol use may cause Disulfram like (Antabuse - alcohol abstinence) reaction. Discourage use together.
- May increase alkaline phosphatase, ALT, AST, BUN, CK, and uric acid levels.
- Contraindicated in patients hypersensitive to Ergot derivatives (migraine) and in those with Uncontrolled Hypertension, Toxemia of pregnancy, Severe Ischemic Heart Disease, or Peripheral Vascular Disease.
- Use cautiously in patients with Impaired Renal or Hepatic function and in those with a history of MI (myocardial infarction/heart attack) with residual Arrhythmias.
- For Parkinson Disease, Parlodel (antiparkinsonism) usually is given with Levodopa or Levodopa and Carbidopa (antiparkinson). The Levodopa and Carbidopa (antiparkinson) may need to be reduced.
- Adverse reactions may be minimized if drug is given in the evening with food.
- Monitor patient for adverse reactions, which occur in 68% of patients, particularly at start of therapy. Most reactions are mild to moderate; nausea is most common. Minimize adverse reactions by gradually adjusting dosages to effective levels. Adverse reactions are more common when drug is used for Parkinson's Disease.
- Baseline and periodic evaluations of cardiac, hepatic, renal, and hematopoietic function are recommended during prolonged therapy.
- Drug may lead to early postpartum conception. After menses resumes, test for pregnancy every 4 weeks or as soon as a period is missed.
- Do not confuse Bromocriptine (Parlodel - antiparkinsonism) with Benztropine (Cogentin - antiparkinsonian) or Brimonidine (for glaucoma), or Parlodel (antiparkinsonism) with Pindolol (Visken - antihypertensive).
- Instruct patient to take drug with meals.
- Advise patient to use contraceptive methods during treatment other than oral Contraceptives or subdermal implants.
- Instruct patient to avoid dizziness and fainting by rising slowly to an upright position and avoiding sudden position changes.
- Inform patient that it may take 8 weeks or longer for menses to resume and excess production of milk to slow down.
- Advise patient to avoid alcohol while taking drug.
SINEMET/LEVODOPA-CARBIDOPA
(Antiparkinsonian)

Indication: Idiopathic Parkinson’s Disease, Postencephalitic Parkinsonism, and Symptomatic Parkinsonism resulting from carbon monoxide or manganese intoxication

Action: Levodopa, a Dopamine precursor, relieves Parkinsonian symptoms by being converted to Dopamine in the brain. Carbidopa inhibits the decarboxylation of peripheral Levodopa, which allows more intact Levodopa to travel to the brain

Adverse Reactions: CNS: Choreiform, dystonia, dyskinetic movements, involuntary grimacing, head movements, myoclonics body jerks, ataxia, worsening hand tremor, muscle twitching, bradykinetic episodes, psychiatric disturbances, anxiety, disturbing dreams, euphoria, malaise, fatigue, severe depression, suicidal tendencies, dementia, delirium, hallucinations, confusion, insomnia, agitation, dizziness, memory loss, headache, numbness, nightmares, delusions, poor coordination

CV: Orthostatic hypotension, cardiac irregularities, phlebitis, palpitations

EENT: Blepharospasm, blurred vision, diplopia, mydriasis, or miosis, oculogyric, excessive salivation, eyelid twitching, difficulty swallowing

GI: Dry mouth, bitter taste, nausea, vomiting, anorexia, constipation, flatulence, diarrhea, abdominal pain or discomfort, excessive salivation, upper GI (gastrointestinal) hemorrhage (with history of peptic ulcer)

GU: Urinary frequency, urine retention, urinary incontinence, darkened urine, priapism

Hematologic: Hemolytic anemia, thrombocytopenia, leukopenia, agranulocytosis

Hepatic: Hepatotoxicity

Musculoskeletal: Muscle twitching, involuntary or spasmodic movements

Metabolic: Weight loss

Respiratory: Hiccups, hyperventilation
Skin: Dark perspiration, melanoma, flushing, rash
Other: Altered or bitter taste, burning sensation of tongue, tooth grinding (especially at night), weight changes, hot flashes

Dosages: 10/100 mg which means 10 mg Carbidopa and 100 mg of Levodopa, orally three times a day; then increase by 1 tablet daily or every other day as needed, to maximum daily dosage of 8 tablets. Optimum daily dose must be determined by careful adjustment for each patient. Available forms: Tablets - 100 mg Levodopa with 10 mg Carbidopa (Sinemet 10 - 100), 100 mg Levodopa with 25 mg Carbidopa (Sinemet 25 - 100), 250 mg Levodopa with 25 mg Carbidopa (Sinemet 25 - 250); tablets extended release) 200 mg Levodopa with 50 mg Carbidopa (Sinemet CR), 100 mg Levodopa with 25 mg Carbidopa: tablets (orally disintegrating) 100 mg Levodopa with 10 mg Carbidopa, 100 mg Levodopa with 25 mg Carbidopa, 250 mg Levodopa with 25 mg Carbidopa. The oral route has a peak of 40 - 150 minutes.

Nursing Considerations: Antihypertensives - may cause additive hypotensive effects - use together cautiously.
-MAO (Monoamine Oxidase) Inhibitors - may cause risk of severe hypertension, avoid using together.
-Phenytoin (Dilantin - anticonvulsant) - may antagonize Antiparkinsonian actions, avoid using together.
-Phenothiazines, other Antipsychotics: may antagonize Antiparkinsonian actions. Use together cautiously.
-Foods high in protein may decrease Levodopa (antiparkinson) absorption, do not give Levodopa (antiparkinson) with high protein foods.
-May increase uric acid, ALT, AST, Alkaline phosphatase, LDH, and bilirubin levels.
-May decrease hemoglobin, hemocrit, and WBC, granulocyte, and platelet counts.
-Contraindicated in patients hypersensitive to drug and in those with glaucoma, melanoma, or undiagnosed skin lesions.
-Contraindicated within 14 days of MAO (Monoamine Oxidase) Inhibitor therapy.
- Use cautiously in patients with severe CV (cardiovascular), renal, hepatic, endocrine, or pulmonary disorders; history of peptic ulcer, psychiatric illness, heart attack, bronchial asthma, and emphysema.
- If patient takes plain Levodopa (antiparkinson), stop drug at least 8 hours before starting Levodopa/Carbidopa (Sinemet - antiparkinson).
- Levodopa Carbidopa (Sinemet - antiparkinson) typically decreases amount of Levodopa (antiparkinson) needed by 75%, reducing risk of adverse reactions.
- Therapeutic and adverse reactions occur more rapidly with Levodopa Carbidopa (Sinemet - antiparkinson) than with Levodopa (antiparkinson) alone. Observe patient and monitor vital signs, especially while adjusting dosage. Report significant changes. Because of risk of precipitating a symptom complex resembling neuroleptic malignant syndrome, observe patient closely if Levodopa (antiparkinson) dosage is reduced abruptly or stopped.
- Hallucinations may require reduction or withdrawal of drug.
- Muscle twitching and blepharo spasm may be early signs of drug overdose; report immediately.
- Test patients receiving long term therapy regularly for diabetes and acromegaly, and periodically for hepatic, renal function.
- Tell patient to take drug with food to minimize GI (gastrointestinal) upset; however, high protein meals can impair absorption and reduce effectiveness.
- Warn patient and caregivers not to increase dosage without your Physician's order.
- Caution patient about possible dizziness when standing up quickly, especially at start of therapy. Tell him to change positions slowly and dangle his legs before getting out of bed. Elastic stockings may control these adverse reactions in some patients.
- Instruct patient to report adverse reactions and therapeutic effects.
- Inform patient that Pyridoxine (Vitamin B6) does not
reverse beneficial effects of Levodopa Carbidopa (Sinemet - antiparkinson).
- Multivitamins can be taken without reversing Levodopa's (antiparkinson) effects.
- Give dose as close as possible to time ordered to ensure stable drug blood level.
- Know that giving extended release form with food increases drug bioavailability.
- If patient needs general anesthesia, continue drug therapy as appropriate (if he is allowed to have oral fluids and drugs).
- Inform patient that muscle and eyelid twitching may indicate toxicity. Tell him to report these symptoms immediately.
- Caution patient not to stop taking drug abruptly.
- Instruct patient to swallow extended release tablets whole without crushing or chewing them.
- Advise patient to move slowly when sitting up or standing, to avoid dizziness or lightheadedness caused by sudden blood pressure drop.
- Tell patient that drug may darken or discolor his urine and sweat.
- As appropriate, review all other significant and life threatening adverse reactions and interactions, especially those related to the drugs, tests, foods, herbs, and behaviors mentioned above.
ANTIPSYCHOTIC AGENTS

Antipsychotic drugs do not cure mental illness, but they calm the intractable patient, relieve the despondency of the severely depressed, activate the immobile and withdrawn, and make some more accessible to psychotherapy.

Most Phenothiazides induce some sedation, especially during the initial phase of the treatment. Medicated patients can, however, be easily roused. In this manner, the Phenothiazides differ markedly from the narcotic analgesics and sedative hypnotics. However, Phenothiazides potentiate the analgesic properties of opiates and prolong the action of CNS (central nervous system) Depressants drugs. These drugs also cause sedation, decrease spontaneous motor activity, and many will lower blood pressure. According to their detailed chemical structure, the Phenothiazides belong to three subgroups.

Aliphatic compounds. Moderate to high sedation, anticholinergic, and orthostatic hypotensive effects. Moderate extrapyramidal symptoms. Often the first choice for patients in acute excitatory states.

Piperazine compounds. Act most selectively on the sub cortical sites. Low to moderate sedative effects, low anticholinergic and orthostatic hypotensive effects, high incidence of extra-pyramidal symptoms. Greatest antiemetic effects because they specifically depress the CTZ (chemoreceptor trigger zone) of the vomiting center.

Piperidine compounds. Low incidence of extrapyramidal symptoms, high sedative and anticholinergic effects, low to moderate orthostatic hypotensive effects.

Action/Kinetics:
It has been postulated that excess amounts of Dopamine in certain areas of the CNS (central nervous system) cause psychoses. Phenothiazides are thought to act by blocking postsynaptic Dopamine receptors, leading to a reduction in psychotic symptoms. The antiemetic effects are thought to be due to inhibition or blockade of Dopamine (2) receptors in the CTZ (chemoreceptor trigger zone) in the medulla, as well as, by peripheral blockade of the vagus nerve in the GI (gastrointestinal) tract. Relief of anxiety is manifested as a result of an indirect decrease in arousal and increased filtering of internal stimuli to the brain stem reticular system. Alphaadrenergic blockade produces sedation. Phenothiazides also raise pain.
threshold and produce amnesia due to suppression of sensory impulses. In addition, these drugs produce anticholinergic and antihistamine effects, and depress the release of hypothalamic and hormones. Peripheral effects include anticholinergic and alpha-adrenergic blocking properties.

**Uses:**
Psychoses (especially if excessive psychomotor activity manifested, involutinal, toxic, or senile psychoses). Used in combination with MAO (Monoamine Oxidase) Inhibitors in depressed patients, manifesting anxiety, agitation, or panic (use with caution). Used also as an adjunct to reducing anxiety, tension, depression, nausea, and vomiting. For severe behavioral problems in children, manifested by hyperexcitability and or combative behavior, also children who exhibit excess motor activity and conduct disorders.

**Contraindications:**
Severe CNS (central nervous system) depression, coma, patients with subcortical brain damage, bone marrow, and depression. In patients with a history of seizures, and in those on Anticonvulsant drugs, geriatric or debilitated patients, hepatic or renal disease, cardiovascular disorders, glaucoma, prostatic hypertrophy, contraindicated in children with chicken pox, CNS (central nervous system) infections, measles, gastroenteritis, dehydration due to increased risk of extrapyramidal symptoms.

**Special Concerns:**
Use with caution in those exposed to extreme heat or cold and in those with asthma, emphysema, or acute respiratory tract infections. Children may be more sensitive to the neuromuscular or extrapyramidal effects (especially dystonias); those especially at risk include children with chickenpox, CNS (central nervous system) infections, measles, dehydration, or gastroenteritis. Phenothiazides are not recommended for use in children under the age of 12.

**Side Effects:**
CNS - depression, drowsiness, dizziness, lethargy, fatigue, extrapyramidal effects, Parkinson like symptoms including shuffling gait or tic like movements of head and face, tardive dyskinesia, akathisia, dystonia, seizures (especially in those with a history), Neuroleptic Malignant Syndrome (rare)
Cardiovascular - orthostatic hypotension, increase or decrease in blood pressure, tachycardia, fainting
GI - dry mouth, anorexia, constipation, paralytic ileus, diarrhea
Endocrine - breast engorgement, increased appetite, weight gain, hyper or hypoglycemia, glycosuria
GU - menstrual irregularities, loss of bladder control, urinary difficulty
Dermatologic - photosensitivity, pruritis, erythema, eczema, dermatitis, pigment changes in skin
Hematologic - anemia
Ophthalmologic - deposition of fine particulate matter in lens and cornea leading to blurred vision, changes in vision
Respiratory - laryngospasm, bronchospasm, laryngeal edema, breathing difficulties
Miscellaneous - fever, muscle stiffness, decreased sweating, muscle spasm of face, neck or back, obstructive jaundice, nasal congestion, pale skin, mydriasis, systemic lupus like symptoms

Tardive Dyskinesia has been observed with all classes of Antipsychotic drugs, although the precise cause is not known. The syndrome is most commonly seen in older patients, especially women, and in individuals with Organic Brain Syndrome. It is often aggravated or precipitated by the sudden discontinuance of Anti-Psychotic drugs and may persist indefinitely after the drug is discontinued. Early signs of Tardive Dyskinesia include the fine rolling movements of the tongue and grimacing or tic like movements of the head and neck. Although there is no known cure for the syndrome, it may not progress if the dosage of the drug is slowly reduced. Also, a few drug-free days may unmask the symptoms of Tardive Dyskinesia and help in early diagnosis.

Overdose Management:
Symptoms:
CNS - depression including deep sleep and coma, hypotension, extrapyramidal symptoms, agitation, restlessness, seizures, hypothermia, hyperthermia, autonomic symptoms, cardiac arrhythmias, EKG changes.

Treatment: emetics are not to be used as they are of little value and may cause a dystonic reaction of the head or neck that may result in aspiration of vomitus. Hypotension: volume replacement, Norepinephrine or Phenylephrine (Coricidin - vasopressor/nasal decongestant) may be used (do not use Epinephrine). Ventricular arrhythmias: Phenytoin (Dilantin) 1 mg/kg/IV, not to exceed 50 mg/min, may be repeated q 5 minutes up to 10 mg/kg.
Seizures or hyperactivity: Diazepam (Valium - anticonvulsant/anxiety) or Pentobarbital (sedative).
Extrapyramidal symptoms: Antiparkinson drugs, Diphenhydramine (Benadryl - antihistamine/antitussive/antiemetic/antivertigo/antidyskinetic), Barbiturates.

**Dosage:**
See individual drugs. Effective over a wide dosage range. Dosage is usually gradual to minimize side effects over 7 days until the minimal effective dose is attained. Dosage is increased more gradually in the elderly or debilitated patients, because they are more susceptible to the effects and side effects of the drugs. After symptoms are controlled, dosage is gradually reduced to maintenance levels. It is usually desirable to keep chronically ill patients on maintenance levels indefinitely. Medication, especially in patients on high dosages, should not be discontinued abruptly.

**NURSING CONSIDERATIONS**

**Assessment**
- Take a complete medical and physical history - note - any drug hypersensitivities or genetic predispositions.
- Determine any history of seizures, this class of drugs may lessen seizure threshold.
- Document indications for therapy - assess baseline mental status, noting mood, behavior, and any depression.
- If administering to children, note extent of hyperexcitability.
- Assess child for chickenpox or measles.
- Note any history of asthma or emphysema.
- Monitor vital signs; assess blood pressure in both arms in a reclining position, standing position, and a sitting position, 2 minutes apart.
- Monitor hematology profile, liver and renal function studies, and urinalysis. EKG, and ocular findings.

**Interventions**
- If administered IV, monitor flow rate and blood pressure. Keep recumbent for at least an hour after IV completed, then slowly elevate head of bed and observe for tachycardia, faintness, or dizziness, supervise ambulation.
- If hospitalized, ensure that medications have been swallowed. May give a liquid preparation to permit better control over taking and to improve compliance.
- Measure intake and output, report abdominal distention and urinary distention.
- May need to reduce dosage, add Antispasmodics or change therapy.
- Note any changes in carbohydrate metabolism (glycosuria, weight loss, polyphagia, increased appetite, or excessive weight gain) may require a change in diet/drug therapy and can be significant with diabetes.
- Some may develop a hypersensitivity reaction with fever, asthma, laryngeal edema, angioneurotic edema, and anaphylactic reaction. Stop medication, notify Physician, and treat symptomatically.
- The antiemetic effects of the Phenothiazides may mask other pathology such as toxicity to other drugs, intestinal obstruction, or brain lesions.
- If receiving barbiturates to relieve anxiety, reduce Barbiturate dose. If administered as an anticonvulsant, do not reduce dosage.
- Discontinue drug gradually to minimize severe GI (gastrointestinal) disturbances or Tardive Dyskinesia.

**Client/Family Teaching**

1. May take with food or milk to minimize GI (gastrointestinal) upset. Take as directed, may be weeks or months before the full effects will be noticed.
2. Do not stop taking the drug abruptly. Abrupt cessation of high doses of Phenothiazides can cause nausea, vomiting, tremors, sensations of warmth and cold, sweating, tachycardia, headache and insomnia.
3. Report distress when in a hot or cold room, may affect heat regulating mechanism:
   a. Provide extra blankets if cold.
   b. Bathe in tepid water if too warm.
   c. Do not use heating pads or hot water bottles if feeling cold.
   d. Avoid hot tubs, hot baths/showers. Low blood pressure may occur from vasodilatation.
4. Report if excessively active or depressed, spasms of the face, neck, back, or tongue may be treated with Antihistamines, or the drug discontinued.
5. Report signs and symptoms of blood dyscrasias, increase body temperature, weakness, easy bruising, or sore throat.
6. Take slow, deep breaths if signs and symptoms of respiratory signs occur, may depress cough reflex.
7. May cause menstrual irregularities, keep accurate record of periods.
8. May develop photosensitivity reactions, wear protective clothing, sunglasses, sunscreen, and avoid sunbathing.
9. Drug may discolor urine, pink or reddish brown, with longterm therapy may
develop a yellow brown skin reaction that may turn grayish purple.

10. Longterm therapy may affect vision, schedule regular ophthalmic exams, report blurred vision.

11. Report evidence of early jaundice, such as high fever, upper abdominal pain, nausea, diarrhea, itching and rash.

12. Withhold drug and report to Physician if yellowing of the skin, sclera, or mucous membranes occurs, may indicate biliary obstruction.

13. To prevent dry mouth, rinse mouth frequently, increase fluid intake, chew sugarless gum, and suck on sour hard candy.

14. Increase fluid and bulk in diet to minimize constipation, may need laxatives, report any urinary retention or persistent constipation.

15. Rise slowly from a lying or sitting position; dangle legs before standing to avoid orthostatic hypotension.

16. Avoid alcohol, over the counter drugs, and any other CNS (central nervous system) Depressants without approval.

17. When working with the elderly, be particularly observant for symptoms of Tardive Dyskinesia, may exhibit puffing of the cheeks or tongue, may develop chewing movements and involuntary movements of the extremities and the trunk.

18. If administering to a child, note neuromuscular reactions, especially if dehydrated or has an acute infection making them more susceptible to side effects.

ABILIFY/ARIPIPRAZOLE
(AntiPsychotic)

Indication: Schizophrenia

Action: Thought to exhibit its antipsychotic effects through partial agonist activity at D2 and Serotonin 1A receptors and antagonist activity at Serotonin 2A receptors

Adverse Reactions: CNS: headache, anxiety, insomnia, lightheadedness, somnolence, akathisia, tremor, asthenia, depression, nervousness, hostility, suicidal thoughts, manic behavior, confusion, abnormal gait, cogwheel rigidity, seizures, fever, tardive dyskinesia, neuroleptic malignant syndrome, increased suicide risk.
CV: Peripheral edema, chest pain, hypertension, tachycardia, orthostatic hypotension, bradycardia
EENT: Rhinitis, blurred vision, increased salivation, conjunctivitis, ear pain
GI: Nausea, vomiting, constipation, anorexia, diarrhea, abdominal pain, esophageal dysmotility
GU: Urinary incontinence
Hematology: Ecchymosis, anemia
Metabolic: Weight gain, weight loss
Musculoskeletal: Neck pain, neck stiffness, muscle cramps
Respiratory: Dyspnea, pneumonia, cough
Skin: Rash, dry skin, pruritus, sweating, ulcer
Other: Flu like syndrome

Dosages: Initially, 10mg - 15 mg orally daily; increase to maximum daily dose of 30 mg if needed, after at least 2 weeks. Available in 10 mg, 15mg, 20mg, and 30 mg doses; in disintegrating tablets; 2 mg, 5 mg, 10 mg, 15 mg, 20 mg, and 30 mg tablets; 1 mg/ml in oral solution and in injectable form. The peak for oral route is 3 - 5 hours and for the injectable route is 1 - 3 hours.

Nursing Considerations: Use cautiously in patients with history of seizures or with conditions that lower the seizure threshold.
- Use cautiously in patients at risk for aspiration pneumonia, such as those with Alzheimer’s Disease.
- Alert! - Neuroleptic Malignant Syndrome may occur with Abilify use (antipsychotic).
-Monitor patients for hyperpyrexia, muscle rigidity, altered mental status, irregular pulse, blood pressure, tachycardia, diaphoresis, and cardiac dysrhythmias. If any of these signs occur, stop the drug and notify your Physician.
-Monitor patients for signs and symptoms of Tardive Dyskinesia. The elderly, especially women are at highest risk of developing this adverse effect.
-Treat patient with the smallest dose for the shortest time and periodically reevaluate for continued treatment.
-Give prescriptions only for small quantities of tablets, to reduce risk of overdose.
-Drugs may impair judgment, thinking, or motor skills due to its psychoactive nature.
-Tell patient that drug may be given without regard to meals.
-Advise patients that grapefruit juice may interact with Abilify (antipsychotic) and to limit or avoid its use.
-Advise patients that gradual improvement in symptoms should occur over several weeks rather than immediately.
-Tell patients to avoid alcohol use while taking drug.
-Advise patients to limit strenuous activity while taking drug to avoid dehydration.
-Caution patient to avoid performing activities that require mental alertness or physical coordination.
-Advise patient to keep ODT (oral disintegrating tablet) in blister package until ready to use. Using dry hands, he should carefully peel open the foil backing and place tablet on the tongue. Tell him not to split tablet.
-Tell patient to store oral solution in refrigerator and that solution can be used for up to 6 months after opening.
CLONIDINE/CATAPRES
(Antihypertensive/Sedative)

Indication: Stabilizing teenagers with behavioral problems; treat spasticity; mild to moderate hypertension; migraine prophylaxis; opiate dependence; Attention Deficit Hyperactivity Disorder (ADHD)

Action: Unknown. Thought to stimulate alpha2 receptors and inhibit the central vasomotor centers, decreasing sympathetic outflow to the heart, kidneys, and peripheral vasculature, and lowering peripheral vascular resistance, blood pressure, and heart rate.

Adverse Reactions: CNS: Drowsiness, dizziness, fatigue, sedation, malaise, depression, agitation, weakness
Cardiovascular: Orthostatic hypotension, bradycardia, severe rebound hypertension
GI: Constipation, dry mouth, nausea, vomiting, anorexia
GU: Urine retention
Metabolic: Weight gain
Skin: Pruritus, dermatitis (from trans dermapatch), rash

Dosages 0.1 - 0.2 mg initially than can increase by 0.1 - 0.2 mg until desired response is attained on a weekly basis (0.1 is equal to 100 mcg), adults and children age 12 and older. Usual range is 0.2 to 0.6 daily in divided doses; infrequently, dosages as high as 2.4 mg daily are used. Or, apply transdermal patch to non-hairy area of intact skin on upper arm or torso once every 7 days, starting with 0.1 mg system and adjusted with another 0.1 mg or larger system. For younger children and ADHD (Attention Deficit Hyperactivity Disorder) may use 50 mcg - 400 mcg twice a day, or up to 900 mcg/day. Available forms are: Transdermal patches which release 0.1/24 hours, 0.2/24 hours or 0.3/24 hours of medication; injection - 100 mcg/ml or 500 mcg/ml; tablets - 0.025 mg, 0.1 mg, 0.2 mg, or 0.3 mg. The oral route has an onset of 30 - 60 minutes with a peak of 2 - 4 hours with a duration of 12 - 24 hours; the transdermal patch has an onset of 2 - 3 days with a peak of 2 - 3 days and a duration of 7 - 8 days and the injection has a peak of 30 - 60 minutes.
Nursing Considerations: Amitriptyline (Elavil - antidepressant), Amoxapine (Ascendin - antidepressant), Clomipramine, (Anafranil - antiobsessional), Desipramine (Norpramin - antidepressant), Doxepin (Sinequan - antidepressant), Imipramine (Tofranil - antidepressant), Nortriptyline (Pamelor - antidepressant), Protriptyline (Vivactil - antidepressant), Triimipramine (antidepressant) may cause loss of blood pressure control with life threatening elevations in blood pressure. Avoid using together.

-CNS (central nervous system) Depressants may increase CNS (central nervous system) depression. Use together cautiously.
-Digoxin (heart), Verapamil (Calan - heart) may cause AV block and severe hypotension. Monitor blood pressure and EKG.
-Diuretics, other Antihypertensives may increase hypotensive effect. Monitor patient closely.
-Beta blockers may cause life threatening hypertension. Closely monitor blood pressure.
-Levodopa (antiparkinson) may reduce effectiveness of Levodopa (antiparkinson). Monitor patient.
-MAO (Monoamine Oxidase) Inhibitors, Prazosin (Minipress - antihypertensive) may decrease Antihypertensive effect. Use together cautiously.
-Propranolol (Inderal - heart), other beta blockers may cause paradoxical hypertensive response. Monitor patient carefully.
-Capsicum, ma huang (herbs) may reduce antihypertensive effectiveness. Discourage use together.
-May decrease urinary excretion of vanillylmandelic acid and catecholamines. May cause a weakly positive Coombs' test result.
-Contraindicated in patients hypersensitive to drug.
-Transdermal form is contraindicated in patients hypersensitive to any component of the adhesive layer of transdermal system.
-Epidural form is contraindicated in patients receiving anticoagulant (to thin the blood) therapy, in those with bleeding diathesis, in those with an injection site infection, and in those who are hemodynamically unstable or have severe CV (cardiovascular) Disease.
- Use cautiously in patients with severe coronary (heart) insufficiency, conduction disturbances, recent MI (myocardial infarction/heart attack), cerebrovascular disease, chronic renal failure, or impaired liver function.

- Drug may be given to lower blood pressure rapidly in some hypertensive emergencies.

- Monitor blood pressure and pulse rate frequently. Dosage is usually adjusted to patient's blood pressure and tolerance.

- Elderly patients may be more sensitive than younger ones to drug's hypotensive effects.

- Observe patient for tolerance to drug's therapeutic effects, which may require increased dosage.

- Noticeable antihypertensive effects of transdermal Clonidine (antihypertensive/sedative) may take 2 to 3 days. Oral antihypertensive therapy may have to be continued in the interim.

- Remove transdermal patch before defibrillation to prevent arcing.

- Stop drug gradually by reducing dosage over 2 to 4 days to avoid rapid rise in blood pressure, agitation, headache, and tremor. When stopping therapy in patients receiving both Clonidine (antihypertensive/sedative) and a beta blocker, gradually withdraw the beta blocker several days before gradually stopping Clonidine (antihypertensive/sedative) to minimize adverse reactions.

- Do not stop drug before surgery.

- Do not confuse Clonidine (antihypertensive/sedative) with Quinidine (heart) or Catapres (antihypertensive/sedative) with Cetapred (an eye ointment) or Combipres (an antihypertensive).

- The injection form is for epidural use only and must be diluted before use in normal saline to yield 100 mcg/ml. When drug is given, carefully monitor infusion pump, and inspect catheter tubing for obstruction or dislodgement.

- Advise patient that stopping drug abruptly may cause severe rebound high blood pressure. Tell him dosage must be reduced gradually over 2 to 4 days as instructed by Physician.
- Tell patient to take the last dose immediately before bedtime.
- Reassure patient that the transdermal patch usually remains attached despite showering and other routine daily activities. Instruct him on the use of the adhesive overlay to provide additional skin adherence, if needed. Also tell him to place patch at a different site each week.
- Caution patient that drug may cause drowsiness but that this adverse effect usually diminishes over 4 to 6 weeks.
- Inform patient that dizziness upon standing can be minimized by rising slowly from a sitting or lying position and avoiding sudden position changes.
CLOZARIL/CLOZAPINE
(Antipsychotics)

Indication: Schizophrenia in severely ill patients unresponsive to other therapies; to reduce risk of recurrent suicidal behavior in Schizophrenia or Schizoaffective Disorders

Action: Unknown. Binds selectively to dopaminergic receptors in the CNS (central nervous system) and may interfere with adrenergic, cholinergic, histaminergic, and serotonergic receptors.

Adverse Reactions: CNS: Drowsiness, sedation, dizziness, vertigo, headache, seizures, syncope, tremor, disturbed sleep or nightmares, restlessness, hypokinesia or akinesia, agitation, rigidity, akathisia, confusion, fatigue, insomnia, hyperkinesia, weakness, lethargy, ataxia, slurred speech, depression, myoclonus, anxiety, fever
CV: Tachycardia, cardiomyopathy, myocarditis, pulmonary embolism, cardiac arrest, hypotension, hypertension, chest pain, EKG changes, orthostatic hypotension
EENT: Visual disturbances
GI: Constipation, excessive salivation, dry mouth, nausea, vomiting, heartburn, diarrhea
GU: Urinary frequency or urgency, urine retention, incontinence
Hematologic: Leukopenia, agranulocytosis, granulocytopenia, eosinophilia
Metabolic: Hyperglycemia, weight gain, hypercholesterolemia, hypertriglyceridemia
Musculoskeletal: Muscle pain or spasm, muscle weakness
Respiratory: Respiratory arrest
Skin: Rash, diaphoresis

Dosages: 12.5 mg once daily or twice a day. If using the oral disintegrating tablet, cut in half and discard the unused half. Adjust dose upward by 25 mg to 50 mg daily (if tolerated) to 300 mg to 450 mg daily by end of 2 weeks. Individual dosage is based on response, patient tolerance and adverse reactions. Subsequent dosage should not be increased more than once or twice weekly and should not exceed 50 mg to 100 mg increments. Many patients respond to dosages of 200 mg to 600 mg daily but
some may need as much as 900 mg daily. Do not exceed 900 mg daily. Available forms are: tablets in 25 mg, 100 mg and 200 mg; tablets (orally disintegrating tablets) 25 mg and 100 mg. Peak level is at 2½ hour and duration is 4 - 12 hours.

Nursing Considerations: Anticholinergics may potentiate anticholinergic effects of Clozaril (antipsychotic). Use together cautiously.

- Antihypertensives may potentiate hypotensive effects. Monitor blood pressure.

- Benzodiazepines may increase risk of sedation, cardiovascular effects and respiratory arrest. Use together cautiously.

- Bone Marrow Suppressants may increase bone marrow toxicity. Avoid using together.

- Citalopram (Celexa - antidepressant), Fluoroquinolones (group of antibiotics like Cipro), Fluoxetine (Prozac - antidepressant), Fluvoxamine (in the same class of SSRI’s (Selection Serotonin Reuptake Inhibitors - like Prozac), Paroxetine (Paxil - antidepressant), Sertraline (Zoloft - antidepressant) may increase Clozaril (antipsychotic) levels and toxicity. Adjust dose as needed.

- Digoxin (heart), other highly protein bound drugs, Warfarin (Coumadin - blood thinner) may increase levels of these drugs. Monitor patient closely for adverse reactions.

- Phenytoin (Dilantin - anticonvulsant) may decrease Clozaril (antipsychotic) level and cause breakthrough psychosis. Monitor patient for psychosis and adjust dosage if needed.

- Psychoactive drugs may cause additive effects. Use together cautiously.

- Ritonavir (Norvir - antiretroviral) may increase Clozaril (antipsychotic) levels and toxicity. Avoid using together.

- St. John’s Wort (herb) may decrease drug level. Discourage use together.

- Alcohol use may increase CNS (central nervous system) depression. Discourage use together.

- Smoking may decrease drug level. Urge patient to quit smoking. Monitor patient for effectiveness and adjust dosage.

- May increase glucose, cholesterol, and triglyceride levels.

- May increase eosinophil count. May decrease granulocyte and WBC counts.
- Contraindicated in patients with uncontrolled epilepsy, history of Clozaril (antipsychotic) induced agranulocytosis, WBC count below 3,500, severe CNS (central nervous system) depression or coma, paralytic ileus, and myelosuppressive disorders.
- Contraindicated in patients taking other drugs that suppress bone marrow function.
- Use cautiously in patients with glaucoma because drug has potent anticholinergic effects.
- Drug carries significant risk of agranulocytosis. If possible, give patient at least two trials of standard Antipsychotic Drugs before starting Clozaril (antipsychotic). Obtain baseline WBC and differential counts before Clozaril (antipsychotic) therapy. Baseline WBC must be at least 3500 and baseline ANC at least 2000. Monitor WBC and ANC values weekly for at least 4 weeks after stopping drug, regardless of how often you were monitoring when therapy stopped.
- During the first 6 months of therapy, monitor patient weekly and dispense no more then a 1 week supply of the drug. If acceptable WBC and ANC values are maintained during the first 6 months of continuous therapy, reduce monitoring to every other week. After 6 months of every other week monitoring without interruption by leukopenia, reduce frequency of monitoring of WBC and ANC to monthly.
- If WBC count drops below 3500 after therapy begins or if it drops substantially from baseline, monitor patient closely for signs and symptoms of infection. If WBC count is 3000 to 3500 and granulocyte count is above 1500, perform WBC and differential count twice weekly. If WBC count drops to 2000 to 3000 or granulocyte count drops to 1000 to 1500 interrupt therapy and notify Physician. Monitor WBC and differential daily until WBC exceeds 3000 and ANC exceeds 1500, and monitor patient for signs and symptoms of infection. Continue monitoring WBC and differential counts twice weekly until WBC counts exceed 3500 and ANC exceeds 2000. Then restart therapy with weekly monitoring for 1 year before returning to the usual monitoring schedule of every 2 weeks for 6 months and then every 4 weeks.
- If the WBC counts drops below 2000 and granulocyte count
drops below 1000, patient may need protective isolation. Bone marrow aspiration may be needed to assess bone marrow function. Future Clozaril (antipsychotic) therapy is contraindicated in these patients.

- Drug increases the risk of fatal myocarditis, especially during, but not limited to the first month of therapy. In patients in whom myocarditis is suspected (unexplained fatigue, dyspnea, tachypnea, chest pain, tachycardia, fever, palpitations, and other signs or symptoms of heart failure or EKG abnormalities, such as ST-T wave abnormalities or arrhythmias) stop therapy immediately and do not restart.

- Drug may cause hyperglycemia. Monitor patients with diabetes regularly. In patients with risk factors for diabetes, obtain fasting blood glucose test results at baseline and periodically.

- Monitor patient for metabolic syndrome, which includes symptoms of significant weight gain and increased body mass index, hypertension, hyperglycemia, hypercholesterolemia, and hypertriglyceridemia.

- Monitor patient for signs and symptoms of cardiomyopathy.

- Seizures may occur, especially in patients receiving high doses.

- Some patients experience transient fever with temperature higher than 100.4 F, especially in the first 3 weeks of therapy. Monitor these patients closely.

- Drug is not indicated for use in elderly patients with dementia related psychosis because of an increased risk for death from CV (cardiovascular) Disease or infection.

- After abrupt withdrawal of longterm therapy, abrupt recurrence of psychosis is possible.

- If therapy must be stopped, withdraw drug gradually over 1 or 2 weeks. If changes in patients medical condition (including development of leukopenia) require that drug be stopped immediately, monitor patient closely for recurrence of psychosis.

- If therapy is reinstated in patients withdrawn from drug, follow usual guidelines for dosage increases. Reexposure of patient to drug may increase severity and risk of adverse reactions. If therapy was stopped because WBC counts were below 2000 or granulocyte counts were below 1000, do not
restart.
- Do not confuse Clozapine (Clozaril - antipsychotic) with Clonidine (Catapres - antihypertensive), Clofazimine (Lamprene - treatment of leprosy), or Klonopin (Clonazepam - anticonvulsant).
- Orally disintegrating tablets contain phenylalanine (amino acid).
- Tell patient about need for weekly blood test to check for blood cell deficiency. Advise him to report flulike symptoms, fever, sore throat, lethargy, malaise, or other signs of infection.
- Warn patient to avoid hazardous activities that require alertness and good coordination while taking drug.
- Tell patient to check with Physician before taking alcohol or nonprescription drugs.
- Advise patient that smoking may decrease drug effectiveness.
- Tell patient to rise slowly to avoid dizziness.
- Tell patient to keep orally disintegrating tablets in the blister package until ready to take it.
- Inform patient that ice chips or sugarless candy or gum may help relieve dry mouth.
**GEODON/ZIPRASIDONE**

*(Antipsychotics)*

**Indication:** Symptomatic treatment of Schizophrenia and rapid control of acute agitation in Schizophrenia patients

**Action:** May inhibit Dopamine and Serotonin 2 receptors, causing reduction in Schizophrenia symptoms

**Adverse Reactions:**

*CNS:* Somnolence, akathisia, dizziness, extrapyramidal symptoms, hypertonia, asthenia, dystonia, (oral route), headache, anxiety, suicide attempt, insomnia, agitation, cogwheel rigidity, parathesia, personality disorder, psychosis, speech disorder (injectable route)

*CV:* Orthostatic hypotension, QT interval prolongation, tachycardia (oral route), hypertension, bradycardia, vasodilatation (injectable route)

*EENT:* Rhinitis, abnormal vision (oral vision)

*GI:* Nausea, constipation, dyspepsia, diarrhea, dry mouth, anorexia, (oral route), abdominal pain, rectal hemorrhage, vomiting, tooth disorder (injectable route)

*GU:* Dysmenorrhea, priapism (injectable route)

*Musculoskeletal:* Myalgia (oral route), back pain (injectable route)

*Respiratory:* Cough (oral route)

*Skin:* Rash (oral route) injection site pain, furunculosis, sweating (injectable route)

*Other:* Flulike syndrome (injectable route)

**Dosages:**

Initially, 20 mg bid with food. Dosages are highly individualized. Adjust dosage, if necessary, no more frequently than every 2 days; to allow for lowest possible doses, the interval should be several weeks to assess symptom response. Effective dosage range is usually 20 mg to 80 mg bid. Maximum dosage is 100 mg bid. For rapid control of acute agitation may give 10 mg - 20 mg IM up to a maximum of 40 mg daily. Doses of 10 mg may be given every 2 hours; doses of 20 mg may be given every 4 hours.

Capsules available in 20 mg, 40 mg, 60 mg, and 80 mg. IM injection available in 20 mg/ml single dose vials after reconstitution. Oral route has an onset of 1 - 3 days with a peak of 6 - 8 hours and a duration of 12 hours. The IM route has a peak of 1 hour.
Nursing Considerations: Antihypertensives may enhance hypotensive effects.

- Monitor blood pressure.
  - Carbamazepine (Tegretol - anticonvulsant) may decrease Geodon (antipsychotic) level, may need to increase Geodon (antipsychotic) dose to achieve desired effect.
  - Drugs that decrease potassium and magnesium, such as diuretics may increase risk of arrhythmias. Monitor potassium and magnesium levels if using these drugs together.
  - Contraindicated in patients hypersensitive to drug.
  - Contraindicated in patients with a history of QT interval prolongation or congenital QT syndrome and in those taking other drugs that prolong QT interval.
  - Use cautiously in patients with history of seizures, bradycardia, hypokalemia, or hypomagnesium, in those with acute diarrhea (may increase risk of developing an arrhythmia), and in those with conditions that may lower the seizure threshold.
  - Use cautiously in patients at risk for aspiration pneumonia.
  - Dizziness, palpitations, or syncope may be symptoms of a life threatening arrhythmia. Please notify your Physician if these symptoms occur.
  - Patient taking an antipsychotic is at risk for developing Neuroleptic Malignant Syndrome or Tardive Dyskinesia.
  - Hyperpyrexia, muscle rigidity, altered mental status, and autonomic instability are signs and symptoms of Neuroleptic Malignant Syndrome, which can be fatal.
  - Assess abnormal involuntary movement before starting therapy, at dosage changes, and periodically thereafter, to monitor patient for Tardive Dyskinesia.
  - Monitor patient for body temperature regulation, especially if patient is exercising strenuously, exposed to extreme heat, receiving concomitant anticholinergics, or being subject to dehydration.
  - Symptoms may not improve for 4 to 6 weeks.
  - Always give drug with food for optimal effect.
HALDOL/HALOPERIDAL
(Antipsychotic)

Indications: Psychotic Disorders including manic states, drug induced psychosis and Schizophrenia, severe behavior in children (those with combative, explosive hyperexcitability not accounted for by immediate provocation), short term treatment of hyperactive children who show excessive motor activity with accompanying conduct consisting of impulsivity, poor attention, aggression, mood lability, or poor frustration tolerance, control of tics and vocal utterances associated with Tourette's Syndrome, may also be used for vomiting

Action: Resembles Phenothiazines - a Butyrophenone (drugs to treat Psychosis) that probably exerts antipsychotic effects by blocking postsynaptic Dopamine receptors in the brain.

Adverse Reactions: CNS: Severe extrapyramidal reactions (high incidence), tardive dyskinesia, neuroleptic malignant syndrome, seizures, sedation, drowsiness, insomnia, vertigo, headache, lethargy, confusion
Cardiovascular - Torsades de pointes with IV use, hypotension, orthostatic hypotension, hypertension, tachycardia, EKG changes
EENT: Blurred vision
GI: Dry mouth, nausea, vomiting, anorexia, constipation, diarrhea, dyspepsia
GU: Urine retention, menstrual irregularities
Hematologic: Leukopenia, leukocytosis
Hepatic: Jaundice
Skin: Rashes, other skin reactions, diaphoresis
Other: Gynecomastia

Dosages: Initially 0.5 mg - 5 mg three times per day in adults and children older than 12 - up to 100mg/day. 3 - 12 years of age or 15 - 40 mg/kg of weight (33 - 88 lbs), initially 0.5 mg orally daily divided two or three times a day, may increase in increments of 0.5 mg every day at 5 to 7 day intervals, depending on therapeutic response and patient tolerance. Severely disturbed children may need higher doses. Each indication may vary in dosages. The available forms are:
tablets - 0.5 mg, 1 mg, 2 mg, 5 mg, 10 mg, and 20 mg; injection - 5 mg/ml; oral concentrate - 2 mg/ml. The peak times are as follows: oral has a peak of 3 – 6 hours; IM has a peak of 10 – 20 minutes.

Nursing Considerations: **Not recommended for treatment for children with Batten Disease. It tends to make them more hyper and anxious.**

- Anticholinergics may increase anticholinergics effects and glaucoma. Use together cautiously.
- Azole antifungals, Buspirone (Buspar - anxiety), Macrolides (class of antibiotics) may increase Haloperidol (Haldol - antipsychotic) level. Monitor patient for increased adverse reactions.
- Carbamazepine (Tegretol - anticonvulsant) may decrease Haldol (antipsychotic) level. Monitor patient.
- CNS (central nervous system) Depressants may increase CNS (central nervous system( depression. Use together cautiously.
- Lithium (anticonvulsant) may cause lethargy and confusion after high doses. Monitor patient.
- Methyldopa (Dopamet - antihypertensive) may cause dementia. Monitor patient closely.
- Rifampin (antituberculosis) may decrease Haldol (antipsychotic) level. Monitor patient for clinical effect.
- Alcohol use may increase CNS (central nervous system) depression. Discourage use together.
- May increase liver function test values. May increase or decrease WBC count.
- Contraindicated in patients hypersensitive to drug and in those with Parkinsonism, coma, or CNS (central nervous system) depression.
- Use cautiously in elderly and debilitated patients; in patients with history of seizures or EEG abnormalities, severe CV (cardiovascular) disorders, allergies, glaucoma, or urine retention; and in those taking Anticonvulsants, Anticoagulants, Antiparkinsonians, or Lithium (antipsychotic).
- Protect drug from light. Slight yellowing of injection or concentrate is common and does not affect potency. Discard very discolored solutions.
- When switching from tablets to Decanoate (Haldol - antipsychotic) injection, give 10 to 15 times the oral dose once a month (maximum 100 mg).
- Dilute oral dose with water or a beverage, such as orange juice, apple juice, tomato juice, or cola, immediately before administration.
- Do not give Decanoate (Haldol - antipsychotic) form IV.
- Monitor patient for Tardive Dyskinesia, which may occur after prolonged use. It may not appear until months or years later and may disappear spontaneously or persist for life, despite ending drug.
- Watch for signs and symptoms of Neuroleptic Malignant Syndrome (extrapyramidal effects, hyperthermia, autonomic disturbances), which is rare but is commonly fatal.
- Do not withdraw abruptly unless required by severe adverse reactions.
- Haldol may contain Tartrazine (the yellow dye in food coloring).
- Do not confuse Haldol (antipsychotic) with Halcion (sleeping) or Halog (corticosteroid - ointment).
- Although drug is the least sedating of the Antipsychotics, warn patient to avoid activities that require alertness and good coordination until effects of drug are known.
- Drowsiness and dizziness usually subside after a few weeks.
- Warn patient to avoid alcohol during therapy.
- Tell patient to relieve dry mouth with sugarless gum or hard candy.
LITHIUM/LITHIUM CARBONATE
(Central Nervous System Drug)

Indication: To prevent or control mania

Action: Unknown. Probably alters chemical transmitters in the CNS (central nervous system), possibly by interfering with ionic pump mechanisms in brain cells, and may compete with or replace sodium ions.

Adverse Reactions: CNS: Tremors, drowsiness, headache, confusion, restlessness, dizziness, psychomotor retardation, lethargy, coma, blackouts, epileptiform seizures, EEG changes, worsened organic mental syndrome, impaired speech, ataxia, incoordination, fatigue.
CV: Reversible EEG changes, arrhythmias, hypotension, bradycardia
EENT: Tinnitus, blurred vision
GI: Dry mouth, metallic taste, nausea, vomiting, anorexia, diarrhea, thirst, abdominal pain, flatulence, indigestion
GU: Polyuria, glycosuria, decreased creatinine clearance, albuminuria, renal toxicity with long term use
Hematologic: Leukocytosis with leukocyte count of 14,000 to 18,000/mm3
Metabolic: Transient hyperglycemia, goiter, hypothyroidism, hyponatremia
Musculoskeletal: Muscle weakness
Skin: Pruritus, rash, diminished or absent sensation, drying or thinning of hair, psoriasis, acne, alopecia
Other: Ankle and wrist edema

Dosages: 300 mg - 600 mg up to four times a day or 900 mg
Controlled released tablets, every 12 hours, increase dosage based on blood levels to achieve optimal dosage. Recommended therapeutic Lithium levels are 1.0 to 1.5 mEq/L for mania and 0.6 to 1.2 mEq/L for maintenance therapy. Available forms are: capsules: 150 mg, 300 mg, 600 mg; tablets 250 mg, 300 mg (300 mg equals 8.12 mEq Lithium); tablets (controlled release) 300 mg,
450 mg. Oral route peak level is between 30 minutes and 3 hours.

Nursing Considerations: ACE Inhibitors may increase Lithium (antipsychotic) level, monitor blood level, adjust dosage as needed.
- Aminophylline (for bronchospasm), Sodium Bicarbonate
- alkalinizer - buffer in the acid-base system), Urine Alkalinizers may increase Lithium (antipsychotic) excretion.
- Avoid excessive salt and monitor Lithium (antipsychotic) blood levels.
- Calcium channel blockers (Verapamil - Calan - heart) may decrease Lithium (antipsychotic) levels and may increase risk of neurotoxicity. Use together cautiously.
- Carbamazepine (Tegretol - anticonvulsant), Fluoxetine (Prozac - antidepressant), Methylidopa (Dopamet - antiparkinsonian), NSAIDS (nonsteroidal antiinflammatory drugs like Iuprofen), Probencid (Benuryl - antigout), may increase effect of Lithium (antipsychotic). Monitor patient for Lithium (antipsychotic) toxicity.
- Neuromuscular Blockers may cause prolonged paralysis or weakness. Monitor patient closely.
- Thiazide diuretics may increase reabsorption of Lithium (antipsychotic) by kidneys, with possible toxic effects. Use with caution, and monitor Lithium (antipsychotic) and electrolyte levels (especially sodium).
- Caffeine may decrease Lithium (antipsychotic) level and drug effect. Advise patient who ingests large amounts of caffeine to tell their Physician before stopping caffeine. Adjust Lithium (antipsychotic) dosage as needed.
- May increase glucose and creatinine levels. May decrease sodium, T3, T4 and protein bound Iodine levels.
- May increase 131I uptake and WBC and neutrophil counts.
- Contraindicated if therapy cannot be closely monitored.
- Use with caution in patients receiving Neuromuscular Blockers and diuretics; in elderly and debilitated patients; and in patients with Thyroid Disease, Seizure Disorder, infection, renal or CV (cardiovascular) Disease, severe debilitation, or sodium depletion.
- Lithium (antipsychotic) may contain Tartrazine (a yellow dye in food coloring).
- Determination of Lithium (antipsychotic) level is crucial to safe use of the drug. Do not use drug in patients who can not have regular tests.

Monitor Lithium (antipsychotic) level 8 to 12 hours after first dose, the morning before second dose is given, two or three times weekly for the first month, then weekly to monthly during maintenance therapy.

- When level of Lithium (antipsychotic) is below 1.5 mEq/L, adverse reactions are usually mild.
- Monitor baseline EKG, thyroid studies, renal studies, and electrolyte levels.
- Check fluid intake and output, especially when surgery is scheduled.
- Weigh patient daily; check for edema or sudden weight gain.
- Adjust fluid and salt ingestion to compensate if excessive loss occurs from protracted diaphoresis or diarrhea. Under normal conditions, patient fluid intake should be 2½ to 3 liters daily and he should follow a balanced diet and adequate salt intake.
- Check urine specific gravity and report level below 1.005 which may indicate Diabetes Insipidus.
- Drug alters glucose intolerance in Diabetics. Monitor glucose level closely.
- Perform outpatient followup of thyroid and renal functions every 6 to 12 months. Palpate thyroid to check for enlargement.
- Do not confuse Lithium (antipsychotic) with Levbid (Levsin – spasm of GI – gastrointestinal tract), Lithonate (a derivative of Lithium), with Lithostat (used to treat chronic urinary infections), or Lithotabs with Lithobid (both are derivatives of Lithium), or Lithostat (again used for urinary infections).
- Tell patient to take drug with plenty of water and after meals to minimize GI (gastrointestinal) upset.
- Explain that Lithium (antipsychotic) has a narrow therapeutic margin of safety. A level that is even slightly high can be dangerous.
- Warn patient and caregivers to expect transient nausea, large amounts of urine, thirst, and discomfort during first few days of therapy and to watch for evidence of toxicity (diarrhea, vomiting, tremor, drowsiness, muscle weakness, incoordination).
- Instruct patient to withhold one dose and call the Physician if signs and symptoms of toxicity appear, but not to stop drug abruptly.
- Warn patient to avoid hazardous activities that require alertness and good psychomotor coordination until CNS (central nervous system) effects of drug are known.
- Tell patient not to switch brands of Lithium (antipsychotic) or take other prescription or OTC (over the counter) drugs without Physician's guidance.
- Tell patient to wear or carry medical identification at all times.
LUVOX/FLUVOXAMINE MALEATE
(Central Nervous System)

Indication: Obsessive Compulsive Disorder (OCD)
Action: Unknown. Selectively inhibits the presynaptic neuronal uptake of Serotonin, which may improve OCD (Obsessive Compulsive Disorder)
Adverse Reactions: CNS: Headache, asthenia, somnolence, insomnia, nervousness, dizziness, tremor, anxiety, hypertonia, agitation, depression, CNS (central nervous system) stimulation
CV: Palpitations, vasodilatation
EENT: Amblyopia
GI: Nausea, diarrhea, constipation, dyspepsia, anorexia, vomiting, flatulence, dysphagia, dry mouth, taste perversion
GU: Urinary frequency, urine retention
Respiratory: Upper respiratory tract infection, dyspnea, yawning
Skin: Sweating
Other: Tooth disorder, flulike syndrome, chills
Dosages: Children ages 8 - 17, 25 mg daily at bedtime initially. Increase by 25 mg every 4 - 7 days. Maximum, 200 mg daily for children ages 8 - 11 and 300 mg daily for children ages 11 - 17. Give total daily amounts over 50 mg in two divided doses. For adults, initially, 50 mg daily at bedtime, increase by 50 mg every 4 - 7 days. Maximum 300 mg daily. Give total daily amounts above 100 mg in two divided doses. Oral route peaks in 3 - 8 hours.
Nursing Considerations: Benzodiazepines, Theophylline (used for acute bronchospasm), Warfarin/Coumadin (to thin the blood) - may reduce clearance of these drugs. Use together cautiously. Do not use Luvox (antidepressant) with Valium anticonvulsant/anxiety).
- Carbamazepine (Tegretol - anticonvulsant), Methadone - opioid detoxification adjunct), Metoprolol (Lopressor - atihypertensive), Propranolol (Inderal - heart), Tricyclic Antidepressants - may increase levels of these drugs, use together cautiously and monitor patient closely for adverse reactions. Dosage adjustment may be needed.
- Cardiazem (heart) may cause bradycardia, monitor heart rate.
-Lithium (antipsychotic), Tryptophan (an amino acid) may enhance effects of Luvox (antidepressant). Use together cautiously.
-Pimodize (Orap - antipsychotic), Thioridazine (Mellaril - antipsychotic, only in Canada) may increase risk of prolonged QT interval. Avoid using together.
-Sumatriptan (Imitrex – for migraines) may cause weakness, hyperreflexia, and incoordination. Monitor patient closely.
-MAO (Monoamine Oxidase) Inhibitors (Phenelzine (Nardil - antidepressant), Selegiline (antidyskinetic), Tranylcypromine - (Parnate - antidepressant) may cause Serotonin Syndrome (CNS - central nervous system - irritability, shivering and altered consciousness). Avoid using within 2 weeks of MAO (Monoamine Oxidase) Inhibitor therapy.
-Contraindicated in patients hypersensitive to drug or to other Phenylpiperazine Antidepressants.
-Use cautiously in patients with hepatic dysfunction, other conditions that may affect hemodynamic responses or metabolism, or history of mania or seizures.
-Record mood changes. Monitor patient with suicidal tendencies.
-Do not confuse Luvox (antidepressant) with Lasix (diuretic), or Fluvoxamine (Luvox) with Fluoxetine (Prozac) both antidepressants.
-Abruptly stopping drug may cause withdrawal syndrome, with symptoms including headache, muscle ache, and flu-like symptoms.
-Warn patient to avoid hazardous activities until CNS (central nervous system) effects of drug are known.
-Tell patient who develops a rash, hives, or a related allergic reaction to notify their Physician.
-Inform patient that several weeks of therapy may be needed to obtain full therapeutic effect. Once improvement occurs, advise patient not to stop drug until directed by Physician.
-Advise patient to check with Physician before taking OTC (over the counter) drugs, drug interactions can occur.
-Tell patient drug can be taken with or without food.
ORAP/PIMOZIDE
(Antipsychotic)

Indication: To suppress motor and phonic tics in patients with Tourette’s Syndrome refractory to first line therapy

Action: Unknown. May block Dopamine nonselectively at both presynaptic and postsynaptic receptors on neurons in the CNS (central nervous system)

Adverse Reactions: CNS: Parkinsonian symptoms, drowsiness, headache, insomnia, other extrapyramidal symptoms, tardive dyskinesia, sedation, neuroleptic malignant syndrome
CV: Prolonged QT interval, hypotension, hypertension, tachycardia
EENT: Visual disturbances
GI: Dry mouth, constipation, excessive salivation
GU: Urinary frequency
Musculoskeletal: Muscle rigidity
Skin: Rash, diaphoresis

Dosages: 1 mg - 2 mg daily in divided doses, then increase every other day as needed. Maintenance dosage is less than 0.2 mg/kg daily or 10 mg/day, whichever is less. Maximum 10 mg daily. Adults and children older than age 12. Oral peak time is 4 – 12 hours.

Nursing Considerations: Contraindicated in patients hypersensitive to drug.
- Contraindicated with other drugs that prolong the QT interval, such as Antiarrhythmics.
- Use cautiously in patients with hepatic or renal dysfunction, glaucoma, seizure disorder or EKG abnormalities.
- Obtain an EKG before treatment begins and periodically thereafter. Watch for prolonged QT interval.
- Monitor patient for extrapyramidal symptoms such as dystonia, akathisia, and hyperflexia.
- Monitor patient for Tardive Dyskinesia, which may occur after prolonged use. It may not appear until months or years later, and may disappear spontaneously or persist for life, despite discontinuing drug.
- Watch for evidence of Neuroleptic Malignant Syndrome (extrapyramidal effects, hyperthermia, autonomic disturbance), which is rare. It may not be related to length of drug use or
type of neuroleptic; more than 60% of affected patients are men.
- If patient also takes an anticonvulsant, watch for increased activity. Orap (antipsychotic) may lower the seizure threshold.
- Warn patient not to stop taking drug abruptly and not to exceed prescribed dosage.
- Tell patient to avoid alcohol and grapefruit juice while taking drug.
- Advise patient to use sugarless hard candy, gum, and liquids to relieve dry mouth.
PROLIXIN/FLUPHENAZINE HYDROCHLORIDE
(Antipsychotics)

Indication: Psychotic disorders

Action: A piperazine phenothiazine that probably blocks postsynaptic Dopamine receptors in the brain

Adverse Reactions: CNS: Extrapyramidal reactions, tardive dyskinesia, pseudoparkinsonism, seizures, neuroleptic malignant syndrome, sedation, EEG changes, drowsiness, dizziness
CV: Orthostatic hypotension, tachycardia, EKG changes
EENT: Blurred vision, ocular changes, nasal congestion
GI: Dry mouth, constipation, increased appetite
GU: Urine retention, dark urine, menstrual irregularities
Hematologic: Leukopenia, agranulocytosis, aplastic anemia, thrombocytopenia, eosinophilia, hemolytic anemia
Hepatic: Cholestatic jaundice
Metabolic: Weight gain
Skin: Mild photosensitivity reactions, allergic reactions

Dosages: 0.5 mg to 10 mg daily in divided doses every 6 to 8 hours; may increase cautiously to 200 mg. Maintenance dose is 1 mg to 5 mg, daily. IM doses are one-third to one-half of oral doses. Usual IM dose is 1.25 mg. Give more than 10 mg daily with caution. Available forms are elixir: 2.5 mg per 5 ml; IM injection is 2.5 mg/ml; oral concentrate is 5 mg/ml; and tablets are in 1 mg, 2.5 mg, 5 mg, and 10 mg. Peak levels are as follows: tablet - onset is less than 1 hour, peak is in 30 minutes and duration is 6 - 8 hours; IM onset is less than 1 hour, peak is 90 to 120 minutes and duration is 6 - 8 hours.

Nursing Considerations: Antacids may inhibit absorption of oral Phenothiazines. Separate antacid and Phenothiazine doses by at least 2 hours. -Anticholinergics may increase anticholinergic effects. Use together cautiously.
-Barbiturates, Lithium (antipsychotic) may decrease Phenothiazine effect and increase neurologic adverse effects. Monitor patient.
-Centrally acting Antihypertensives may decrease antihypertensive effect. Monitor blood pressure.
-CNS (central nervous system) Depressants may increase CNS
Use together cautiously.

- St. John's Wort (herb) may increase risk of photosensitivity reactions.
- Advise patient to avoid excessive sunlight exposure.
- Alcohol use may increase CNS (central nervous system) depression, especially that involving psychomotor skills. Strongly discourage alcohol use.
- Sun exposure may increase risk of photosensitivity reactions. Advise patient to avoid excessive sunlight exposure.
- May decrease hemoglobin level and hematocrit.
- May increase eosinophil count and liver function test values. May decrease granulocytes, platelet, and WBC counts.
- May cause false positive results for amylase, 5 hydroxyindoleacetic acid, urinary porphyrin, and urobilinogen tests that use human chorionic gonadotropin.
- Contraindicated in patients hypersensitive to drug and in those with coma, CNS (central nervous system) depression, bone marrow suppression or other blood dyscrasia, subcortical damage or liver damage.
- Use cautiously in elderly or debilitated patients and in those with pheochromocytoma, severe CV (cardiovascular) Disease (may cause sudden drop in blood pressure), peptic ulcer, respiratory disorder, hypocalcemia, seizure disorder (may lower seizure threshold), severe reactions to insulin or electroconvulsive therapy, mitral insufficiency, glaucoma, or prostatic hyperplasia.
- Use cautiously in those exposed to extreme heat or cold (including antipyretic therapy) or phosphorous insecticides.
- Use parenteral form cautiously in patients who have asthma or are allergic to sulfites.
- Prolixin (antipsychotic) concentrate is 10 times more concentrated than Prolixin (antipsychotic) elixir (5 mg/ml versus 0.5 mg/ml). Check dosage order carefully.
- Oral liquid and parenteral forms can cause contact dermatitis. Wear gloves when preparing solutions and avoid contact with skin and clothing.
- Protect drug from light. Slight yellowing of injection or concentrate is common and does not affect potency. Discard
markedly discolored solutions.
-Dilute liquid concentrate with water, fruit juice, milk, or semisolid food just before administration.
-For long acting form, which is an oil preparation, use a dry needle of at least 21 G. Allow 24 to 96 hours for onset of action. Note and report to physician adverse reactions in patients taking this form.
-Monitor patient for Tardive Dyskinesia, which may occur after prolonged use. It may not appear until months or years later and may disappear spontaneously or persist for life, despite ending drug.
-Watch for signs and symptoms of Neuroleptic Malignant Syndrome (extrapyramidal effects, hyperthermia, autonomic disturbance), which is rare but commonly fatal. It may not be related to length of drug use or type of neuroleptic; more than 60% of affected patients are men.
-Withdraw dose and notify Physician if patient - especially if a child develops signs or symptoms of blood dyscrasia (fever, sore throat, infection, cellulitis, weakness) or extrapyramidal reactions persisting longer than a few hours.
-Do not withdraw drug abruptly unless serious adverse reactions occur.
-Abrupt withdrawal of long term therapy may cause gastritis, nausea, vomiting, dizziness, tremor, feeling of warmth or cold, diaphoresis, tachycardia, headache, or insomnia.
-Prolixin (antipsychotic) may contain Tartrazine (a yellow dye in food coloring).
-Warn patient to avoid activities that require alertness and good coordination until effects of drug are known.
-Warn patient to avoid alcohol while taking drug.
-Tell patient to relieve dry mouth with sugarless gum or hard candy.
-Have patient report signs of urine retention or constipation.
-Advise patient to use sunblock and wear protective clothing to avoid sensitivity to the sun.
-Tell patient that drug may discolor urine.
RISPERDAL/RISPERIDONE
(Antipsychotic)

Indication: Short term (6 to 8 weeks) treatment of Schizophrenia; to delay relapse in Schizophrenia therapy lasting 1 to 2 years; monotherapy or combination therapy with Lithium (antipsychotic) or Valproate (anticonvulsant) for 3 week treatment of acute manic or mixed episodes from Bipolar I Disorder; (new indication) irritability, including aggression, self-injury, and temper tantrums, associated with an Autistic Disorder (where our children with Batten Disease fit)

Action: Blocks Dopamine and Serotonin receptors - also blocks alpha and histamine receptors in the CNS (central nervous system). This medication acts to balance two nerve impulses and by doing so, helps restore more normal thinking and mood, has fewer side effects.

Adverse Reactions: CNS: Akathisia, somnolence, dystonia, headache, insomnia, agitation, anxiety, pain, parkinsonism, neuroleptic malignant syndrome, suicide attempt, dizziness, fever, hallucination, mania, impaired concentration, abnormal thinking and dreaming, tremor, hypoesthesia, fatigue, depression, nervousness
Cardiovascular: Tachycardia, chest pain, orthostatic blood pressure, peripheral edema, syncope, hypertension
EENT: Rhinitis, sinusitis, pharyngitis, abnormal vision, ear disorder (IM)
GI: Constipation, nausea, vomiting, dyspepsia, abdominal pains, anorexia, dry mouth, increased saliva, diarrhea
GU: Urinary incontinence, increased urination
Metabolic: Weight gain, hyperglycemia, weight loss
Musculoskeletal: Arthralgia, back pain, leg pain, myalgia
Respiratory: Coughing, dyspnea, upper respiratory infection
Skin: Rash, dry skin, photosensitivity, acne, injection site pain (IM)
Other: Tooth disorder, toothache, injury

Dosages: Initially, 0.5 mg orally once daily or divided twice a day. After 4 days, increase dose to 1 mg. Increase dosage further in 0.5 mg increments at intervals of at least 2 weeks. Of children age 5 and older and adolescents, with a guideline of children
weighing 20 kg or 44 lbs. For children age 5 and older who weigh less than 20 kg or 44 lbs initially 0.25 mg oral once daily or divided twice a day. After 4 days, increase dose to 0.5 mg. Increase dosage further in 0.25 mg increments at intervals of at least 2 weeks. Increase cautiously in children who weigh less than 15 kg or 33 lbs. Each indication may vary with dosing. Available forms are: injection – 25 mg, 37.5 mg and 50 mg; solution – 1 mg/ml; tablets – 0.25, 0.5 mg, 1 mg, 2 mg, 3 mg, 4 mg; tablets (orally disintegrating) 0.5 mg, 1 mg, 2 mg, 3 mg, 4 mg. The oral route has a peak of 1 hour and the IM route has an onset of 3 week, a peak of 4 - 6 week and a duration of 7 weeks.

Nursing Considerations: Children with Batten Disease can have fairly severe withdrawal symptoms if stopped abruptly, very agitated, increased movement, and uncontrollable.

- Antihypertensives may enhance hypotensive effects. Monitor blood pressure.
- Carbamazepine (Tegretol - anticonvulsant) may increase Risperdal (antipsychotic) clearance and decrease effectiveness. Monitor patient closely.
- Clozapine (Clozaril - antipsychotic) may decrease Risperdal (antipsychotic) clearance, increasing toxicity. Monitor patient closely.
- CNS (central nervous system) Depressants may cause additive CNS (central nervous system) depression. Use together cautiously.
- Dopamine Antagonists, Levodopa (antiparkinson) may antagonize effects of these drugs. Use together cautiously and monitor patient.
- Fluoxetine (Prozac), Paroxetine (Paxil) both antidepressants may increase the risk of Risperdal’s (antipsychotic) adverse effects, including Serotonin Syndrome. Monitor patient closely and adjust Risperdal (antipsychotic) dose as needed.
- Alcohol use may cause additive CNS (central nervous system) depression. Discourage use together.
- Sun exposure may increase risk of photosensitivity reactions. Advise patient to avoid excessive sunlight exposure.
- May increase prolactin level. May decrease hemoglobin level
and hematocrit.
- Contraindicated in patients hypersensitive to drug.
- Use cautiously in patients with prolonged QT interval, CV (cardiovascular) Disease, Cerebrovascular Disease, Dehydration, Hypovolemia, History of Seizures, or conditions that could affect metabolism or hemodynamic responses.
- Use cautiously in patients exposed to extreme heat.
- Use caution in patients at risk for Aspiration Pneumonia.
- Use IM injection cautiously in those with hepatic or renal impairment.
- Obtain baseline blood pressure measurement before starting therapy, and monitor pressure regularly. Watch for orthostatic hypotension, especially during first dosage adjustment.
- Fatal cerebrovascular adverse events (stroke, TIA - transient ischemic attack) may occur in elderly patients with dementia. Drug is not safe or effective in these patients.
- Monitor patient for Tardive Dyskinesia, which may occur after prolonged use. It may not appear until months or years later and may appear spontaneously or persist for life, despite stopping drug.
- Watch for evidence of Neuroleptic Malignant Syndrome (extrapyramidal effects, hyperthermia, autonomic disturbances) which is rare but can be fatal.
- Life-threatening Hyperglycemia may occur in patients taking Atypical Antipsychotics. Monitor patients with diabetes regularly.
- Monitor patient for symptoms of Metabolic Syndrome (significant weight gain and increased BMI (basal metabolic index), hypertension, hyperglycemia, hypercholesterolemia, and hypertriglyceridemia).
- Periodically reevaluate drug's risk and benefits, especially during prolonged use.
- To reconstitute IM (intramuscular) injection, inject premeasured diluent into vial and shake vigorously for at least 10 seconds. Suspension appears uniform, thick, and milky; particles are visible, but no dry particles remain. Drug should be used immediately, but may be refrigerated up to 6 hours of
reconstitution. If more than 2 minutes pass before injection, shake vigorously again. See manufacturer's package insert for more detailed instructions.

- Refrigerate IM injection kit and protect it from light. Drug can be stored at temperature less than 77 degrees F (25C) for no more than 7 days before administration.
- Continue oral therapy for the first 3 weeks of IM injection therapy until injections take effect. Then stop oral therapy.
- Phenylalanine (Alkeran for multiple myeloma) contents of orally disintegrating tablets are as follows: 0.5 mg tablet contains 0.14 mg Phenylalanine; 1 mg tablet contains 0.28 mg Phenylalanine; 2 mg tablet contains 0.56 mg Phenylalanine; 3 mg tablet contains 0.63 mg Phenylalanine; 4 mg tablet contains 0.84 mg Phenylalanine.
- Monitor patient for weight gain.
- Do not confuse Risperidone (Risperdal - antipsychotic) with Reserpine - antihypertensive.
- Warn patient to avoid activities that require mental alertness until effects of drug are known.
- Warn patient to rise slowly, avoid hot showers, and use other precautions to avoid fainting when starting therapy.
- Advise patient to use caution in hot weather to prevent heatstroke.
- Tell patient to take drug with or without food.
- Instruct patient to keep the orally disintegrating tablet in the blister pack until just before taking it. After opening the pack, dissolve the tablet on tongue without cutting or chewing. Peel apart the foil to expose the tablet; do not attempt to push it through the foil.
- Tell patient to use sunblock and wear protective clothing outdoors.
- Advise patient to avoid alcohol during therapy.
SERQUEL/QUETIAPINE FUMARATE
(Antipsychotic)

Indication: Depression associated with Bipolar Disorder (new indication); to manage signs and symptoms of Psychotic Disorders; and monotherapy and adjunct therapy with Librium (anxiety - not used very much any longer) or Divalproex (another name for Depakote - anticonvulsant) for the short term treatment of acute manic episodes associated with Bipolar I Disorder.

Action: Unknown. A Benzodiazepine derivative that may block Dopamine and Serotonin 5-HT2 receptors in the brain, acts as a receptor antagonist of histamine and adrenergic receptor sites

Adverse Reactions: CNS: Dizziness, headache, somnolence, neuroleptic malignant syndrome, seizures, hypertonia, dysarthria, asthenia Cardiovascular: Orthostatic hypotension, tachycardia, palpitations, peripheral edema Respiratory: Increased cough, dyspnea EENT: Ear pain, rhinitis, pharyngitis GI: Dry mouth, dyspepsia, abdominal pain, constipation, anorexia Hematologic: Leukopenia Metabolic: Weight gain, hyperglycemia Musculoskeletal: Back pain Skin: Rash, diaphoresis Other: Flulike syndrome

Dosages: Initially, 25 mg orally twice/day with increases in increments of 25 mg to 50 mg twice a day to three times a day on days 2 and 3, as tolerated. Target range is 300 mg to 400 mg daily divided into two or three doses by day 4. Further dosage adjustments, if indicated, should occur at intervals of not less than two days. Dosage can be increased or decreased by 25 mg to 50 mg twice a day. Antipsychotic effect generally occurs at 150 mg to 750 mg daily. Safety of dosages over 800 mg daily has not been evaluated. Each indication may vary in dosages. Available forms are: 25 mg, 100 mg, 200 mg, and 300 mg tablets. The peak time is 1½ hour.

Nursing Considerations: Antihypertensives may increase effects of antihypertensives. Monitor blood pressure. -Carbamazepine (Tegretol - anticonvulsant), Glucocorticoids,
Phenobarbital (Luminal – anticonvulsant/sedative), Phenytoin (Dilantin – anticonvulsant), Rifampin (antitubercular), Thioridazine (Mellaril – antipsychotic – only in Canada) may increase Seroquel (antipsychotic) clearance. May need to adjust Seroquel (antipsychotic) dosage.

-CNS (central nervous system) Depressants may increase CNS (central nervous system) effects. Use together cautiously.

-Dopamine agonists, Levodopa (Parkinson Disease) may antagonize the effects of these drugs. Monitor patient.

-Erythromycin (antibiotic), Fluconazole (Diflucan), Itraconazole (Sporonox), Ketoconazole (Nizoral) all antifungals, may decrease Seroquel (antipsychotic) clearance. Use together cautiously.

-Lorazepam (Ativan - antianxiety) may decrease Ativan (antianxiety) clearance. Monitor patient for increased CNS (central nervous system) effects.

-Alcohol use may increase CNS (central nervous system) effects. Discourage use together.

-May increase liver enzyme, cholesterol, triglyceride, and glucose levels. May decrease T4, and thyroid stimulating hormone levels.

-May decrease WBC count.

-Contraindicated in patients hypersensitive to drug or its ingredients.

-Drug is not indicated for use in elderly patients with dementia related psychosis because of increased risk of death from CV (cardiovascular) Disease or infection.

-Watch for evidence of Neuroleptic Malignant Syndrome (extrapyramidal effects, hyperthermia, autonomic disturbance), which is rare but deadly.

-Monitor patient for Tardive Dyskinesia, which may occur after prolonged use. It may not appear until months or years later and may disappear spontaneously or persist for life, despite ending drug.

-Hyperglycemia may occur in patients taking drug. Monitor patients with diabetes regularly.

-Monitor patient for weight gain.

-Monitor patient for symptoms of Metabolic Syndrome (significant weight gain and increased BMI (basal metabolic...
index), hypertension, hyperglycemia, hypercholesterolemia, and hypertriglyceridemia).
-Drug use may cause cataract formation. Obtain baseline ophthalmologic examination and reassess every 6 months.
-Advise patient about risk of dizziness upon standing during the 3 to 5 day period of first dosage adjustment, when resuming treatment, and when increasing dosages.
-Tell patient to avoid becoming overheated or dehydrated.
-Warn patient to avoid activities that require mental alertness until effects of drug are known, especially during first dosage adjustment or dosage increases.
-Remind patient to have an eye examination at start of therapy and every 6 months during therapy to check for cataracts.
-Tell patient to notify Physician about other prescription or over the counter drugs he is taking or plans to take.
-Advise patient to avoid alcohol while taking alcohol.
-Tell patient to take drug with or without food.
**TENEX/GUANFACINE HYDROCHLORIDE**
*(Antihypertensive)*

**Indication:** Hypertension, migraine

**Action:** Centrally acting alpha2adrenoreceptor agonist. Reduces sympathetic outflow from the vasomotor center to the heart and blood vessels, resulting in a decrease in peripheral vascular resistance and a reduction in heart rate.

**Adverse Reactions:**
- **CNS:** Dizziness, somnolence, fatigue, headache, insomnia, asthenia
- **CV:** Bradycardia
- **GI:** Constipation, dry mouth, diarrhea, nausea
- **Skin:** Dermatitis, pruritus

**Dosages:**
1 mg once daily at bedtime initially. If response is not adequate after 3 or 4 weeks, increase dosage to 2 mg daily. Dosage may be further increased to 3 mg after an additional 3 to 4 weeks. Available in tablets of 1 mg and 2 mg. Peak level in 1 - 4 hours. Duration of 24 hours.

**Nursing Considerations:**
- CNS (central nervous system) Depressants may increase sedation. Use together cautiously. Tricyclic Antidepressants may inhibit antihypertensive effects. Monitor blood pressure.
- Contraindicated in patients hypersensitive to drug.
- Drug may be used alone or with a diuretic.
- Rebound hypertension may occur and if it occurs, will be noticeable within 2 to 4 days after therapy ends.
- Do not confuse drug Guanfacine (Tenex - antihypertensive) with Guanidine (lower blood cells that help your body fight infections), Guaifenesin (Robitussin - antitussive), or Guanabenz (Wytensin - antihypertensive). Do not confuse Tenex (antihypertensive) with Xanax (antianxiety), Entex (Children's Advil Cold), or Ten-K (potassium supplement).
- Tell patient not to stop therapy abruptly. Rebound high blood pressure may occur but is less common than that which occurs with similar drugs.
- Advise patient to avoid activities that require alertness before drug's effects on him are known; drowsiness may occur.
- Warn patient that he may have a lower tolerance to alcohol and other CNS (central nervous system) Depressants during
therapy.
THORAZINE/CHLORPROMAZINE HYDROCHLORIDE
(Psychosis, Mania)

Indication: Psychosis/mania, it is used for nausea/vomiting and also intractable hiccups

Action: Unknown. A Piperidine Phenothiazine that probably blocks postsynaptic Dopamine receptors in the brain

Adverse Reactions: CNS: Extrapyramidal reactions, drowsiness, sedation, seizures, tardive dyskinesia, pseudoparkinsonism, dizziness, neuroleptic malignant syndrome
CV: Orthostatic hypotension, tachycardia, Quinidine - like EKG effects
EENT: Ocular changes, blurred vision, nasal congestion
GI: Dry mouth, constipation, nausea
GU: Urinary retention, menstrual irregularities
Hematologic: Leukopenia, agranulocytosis, eosinophilia, hemolytic anemia, aplastic anemia, thrombocytopenia
Hepatic: Jaundice
Skin: Mild photosensitivity reactions, allergic reactions, pain at IM injection site, sterile, skin pigmentation changes

Dosages: 30 mg - 60 mg daily in two to four divided doses. Increase dosage by 20 mg to 50 mg twice weekly until symptoms are controlled. Children 6 months and older - .55 mg/kg orally every 4 - 6 hours. Maximum dose is 40 mg up to a child weighing 50 lbs, and 75 mg for a child weighing up to 75 lbs. Available forms: capsules (extended release) 200 mg, 300 mg; injection 25 mg/ml; oral concentrate 30 mg/ml, 100 mg/ml; syrup 10 mg/5 ml; tablets 10 mg, 25 mg, 50 mg, 100mg, 200mg. The oral route has an onset of 30 - 60 minutes with a duration of 4 - 6 hours; the oral (extended) also has an onset of 30 - 60 minutes with a duration of 10 - 12 hours; the rectal route has an onset greater than 1 hour with a duration of 3 - 4 hours.

Nursing Considerations: If given with the following may see adverse effects:
- Antacids - may inhibit the absorption of Thorazine (antipsychotic).
- Anticholinergics such as Tricyclic Antidepressants, Antiparkinsonians may increase anticholinergic activity,
aggravated Parkinsonian symptoms. Use together cautiously.
-Anticonvulsants – may lower seizure threshold.
-Barbiturates, Lithium (antipsychotic) may decrease Phenothiazine effect. Monitor patient.
-Lithium (antipsychotic) - may decrease Thorazine (antipsychotic) effect.
-Centrally acting Hypertensives - monitor blood pressure,
-CNS (central nervous system) Depressants - may increase CNS (central nervous system) depression - use together cautiously,
-Electroconvulsive therapy (ECT), insulin may cause severe reactions. Monitor patient closely.
-Meperidine (Demerol - pain) - may cause excessive sedation and hypotension - do not use together.
-Propranolol (Inderal - heart) - may increase levels of both Inderal (heart) and Chlorpromazine (Thorazine - antipsychotic). Monitor patient closely.
-Warfarin (Coumadin - blood thinner) may decrease effect of oral - anticoagulants. Monitor PT and INR.
-Drug ST. John’s Wort (herb) may cause photosensitivity reactions - advise patient to avoid excessive sunlight exposure.
-Alcohol use - may increase CNS (central nervous system) depression, particularly psychomotor skills - strongly discourage alcohol use.
-May increase liver function tests values and eosinophil count.
-May decrease hemoglobin, hematocrit, and WBC, granulocyte, and platelet counts.
-Contraindicated in patients hypersensitive to drug; in those with CNS (central nervous system) depression, bone marrow suppression, or subcortical damage, and in those with coma.
-Use cautiously in elderly or debilitated patients and in patients with hepatic or renal disease, severe CV (cardiovascular) Disease (may suddenly decrease blood pressure), Respiratory Disorders, Hypocalcemia (low blood calcium), Glaucoma (pressure in the eye).
-Also use cautiously in those exposed to extreme heat and cold.
-Use cautiously in acutely ill or dehydrated children.
-Obtain baseline blood pressure measurements before starting therapy, and monitor regularly. Watch for orthostatic
hypotension.
- If given IM (intermuscular) monitor blood pressure before and after, keep patient supine for 1 hour afterward and have him/her get up slowly.
- Wear gloves when preparing solutions and avoid contact with skin and clothing - oral liquid and parenteral forms can cause contact dermatitis. Protect liquid concentrate from light.
- Dilute with fruit juice, milk, or semisolid food just before administration.
- If giving IM injections, give only in upper outer quadrants of buttocks. Massage slowly afterward to prevent sterile abscess. Injection stings. Rotate injection sites.
- Monitor patient for Tardive Dyskinesia, which may occur after prolonged use. It may not appear until months or years later and may disappear spontaneously or persist for life, despite stopping drug.
- After abrupt withdrawal of long term therapy, gastritis, nausea, vomiting, dizziness, or tremors may occur.
- Watch for evidence of Neuroleptic Mmalignant Syndrome (extrapyramidal effects, hyperthermia, autonomic disturbance), which is rare.
- Monitor therapy with weekly bilirubin testing during first month; with periodic CBC's, liver function tests; and with ophthalmic tests for long term use.
- Withhold dose and notify Physician if jaundice, symptoms of blood dyscrasia (fever, sore throat, infection, cellulitis, weakness), or persistent extrapyramidal reactions (longer than a few hours) develop, or if such reactions occur in children.
- Do not withdraw drug abruptly unless necessitated by severe adverse reactions.
- Do not confuse Chloropromazine (Thorazine - antipsychotic)) with other drugs that sound similar - Chlorpropamide (hypoglycemic) or Clomipramine (antidepressant).
- Avoid activities that require alertness or good coordination until effects of drug are known. Drowsiness and dizziness usually subside after first few weeks.
- Advise not to crush, chew, or break extended release capsule form before swallowing.
- Avoid alcohol while taking Thorazine (antipsychotic).
- Report signs of urine retention or constipation.
- Use sunblock and to wear protective clothing to avoid oversensitivity to the sun. Relieve dry mouth with sugarless gum or hard candy.
ZYPREXA (OLANZAPINE)

(Antipsychotic)

Indication: Schizophrenia, short-term treatment of acute manic episodes linked to Bipolar I disorder, Short-term treatment, with Lithium or Valproate, of acute manic episodes linked to Bipolar I, Disorder, long-term treatment of Bipolar I disorder, adjunct to Lithium or Valproate to treat Bipolar mania, agitation caused by Schizophrenia and Bipolar I mania

Action: May block Dopamine and 5-HT receptors

Adverse Reactions: CNS: Somnolence, insomnia, parkinsonism, dizziness, neuroleptic malignant syndrome, suicide attempt, abnormal gait, asthenia, personality disorder, akathisia, tremor, articulation, impairment, tardive dyskinesia, fever, extrapyramidal events (IM)

CV: Orthostatic hypotension, tachycardia, chest pain, hypertension, ecchymosis, peripheral edema, hypotension (IM)

EENT: Amblyopia, rhinitis, pharyngitis, conjunctivitis

GI: Constipation, dry mouth, dyspepsia, increased appetite, increased salivation, vomiting thirst

GU: Hematuria, metrorrhagia, urinary incontinence, urinary tract infection, amenorrhea, vaginitis

Hematologic: Leukopenia

Metabolic: Hyperglycemia, weight gain

Musculoskeletal: Joint pain, extremity pain, back pain, neck rigidity, twitching, hypertonia

Respiratory: Increased cough, dyspnea

Skin: Sweating, injection site pain (IM)

Other: Flulike syndrome, injury

Dosages: Initially, 5 mg to 10 mg orally once daily with the goal to be at 10 mg daily within several days of starting therapy. Adjust dose in 5 mg increments at intervals of 1 week or more. Most patients respond to 10 mg or 15 mg daily. Safety of dosages greater than 20 mg daily has not been established. Available in: injection - 10 mg; tablets - 2.5 mg, 5 mg, 7.5 mg, 10 mg, 15 mg, and 20 mg; tablets - (orally disintegrating), 5 mg, 10 mg, 15 mg, and 20 mg. The oral route has a peak time of 6 hours. The IM route has a peak time of 15 to 45 minutes.
Nursing Considerations: Antihypertensives may potentiate hypotensive effects. Monitor blood pressure closely.
- Carbamazepine (Tegretol), Omeprazole (Prilosec), Rifampin (tuberculosis), may increase clearance of Zyprexa. Monitor patient.
- Ciproflaxacin (Cipro) may increase Zyprexa level. Monitor patient for increased adverse effects.
- Diazepam (Valium) may increase CNS (central nervous system) effects. Monitor patient.
- Dopamine (Intropin) agonists, Levodopa (Parkinson) may cause antagonized activity of these drugs. Monitor patient.
- Fluoxetine (Prozac) may increase Zyprexa level. Use together cautiously.
- Fluvoxamine (Luvox) may increase Zyprexa level. Use together cautiously.
- St John’s Wort may decrease drug level. Discourage use together.
- Alcohol use may increase CNS (central nervous system) effects. Discourage use together.
- Smoking may increase drug clearance. Urge patient to quit smoking.
- May increase AST, ALT, GGT, CK, triglyceride, and prolactin levels.
- May increase increase eosinophil count. May decrease WBC count.
- Contraindicated in patients hypersensitive to drug.
- Use cautiously in patients with heart disease, cerebrovascular disease, conditions that predispose patient to hypotension, history of seizures or conditions that might lower the seizure threshold, and hepatic impairment.
- Use cautiously in elderly patients, those with a history of paralytic ileus, and those at risk for aspiration pneumonia, prostatic hyperplasia, or angle-closure glaucoma.
- Inspect IM solution for particulate matter and discoloration before administration.
- To reconstitute IM injection, dissolve contents of one vial with 2.1 ml of sterile water for injection to yield a clear yellow 5 mg/ml solution. Store at room temperature and give within 1
hour of reconstitution. Discard any unused solution.
- Monitor patient for abnormal body temperature regulation, especially if he exercises, is exposed to extreme heat, takes anticholinergics, or is dehydrated.
- Obtain baseline and periodic liver functions test results.
- Monitor patient for weight gain.
- Watch for evidence of neuroleptic malignant syndrome (hyperpyrexia, muscle rigidity, altered mental status, autonomic instability), which is rare but commonly fatal. Stop drug immediately; monitor and treat patient as needed.
- Drug may cause hyperglycemia. Monitor patients with diabetes regularly. In patients with risk factors for diabetes, obtain fasting blood glucose test results at baseline and periodically.
- Monitor patient for symptoms of metabolic syndrome (significant weight gain and increased BMI (base metabolic index), hypertension, hyperglycemia, hypercholesterolemia, and hypertriglyceridemia.
- Monitor patient for tardive dyskinesia, which may occur after prolonged use. It may not appear until months or years later and may disappear spontaneously or persist for life, despite stopping drug.
- Periodically reevaluate the long-term usefulness of Zyprexa.
- Drug may increase risk of stroke and death in elderly patients with dementia. Zyprexa is not approved to treat patients with dementia-related psychosis.
- A patient who feels dizzy or drowsy after an IM injection should remain recumbent until he can be assessed for orthostatic hypotension and bradycardia. He should rest until the feeling passes.
- Do not confuse Olanzapine with Olsalazine (anti-inflammatory) or Zyprexa with Zyrtec (antihistamine/decongestant).
- Warn patient to avoid hazardous tasks until full effects of drug are known.
- Warn patient against exposure to extreme heat; drug may impair body's ability to reduce temperature.
- Inform patient that he may gain weight.
- Advise patient to avoid alcohol.
- Tell patient to rise slowly to avoid dizziness upon standing up
quickly.
- Inform patient that orally disintegrating tablets contain Phenylalanine (an essential amino acid - but if too much in the body can cause PKU - Phenylketonuria, found in babies).
- Drug may be taken without regard to food.
ANTISPASMODICS

Action/Kinetics:
These drugs decrease muscle tone and involuntary movement. Many relieve anxiety and tension as well. Although the precise mechanism of action is unknown, most of these agents depress spinal polysynaptic reflexes. Their beneficial effects may also be attributable to their antianxiety activity. Several of the drugs in this group also manifest analgesic properties.

Uses:
Musculoskeletal and Neurological Disorders associated with muscle spasms, hyper-reflexia, and hypotonia, including Parkinson’s, tetanus headaches, acute muscle spasms caused by trauma and inflammation (low back syndrome, strains, arthritis, and bursitis). They also may be useful in the management of Cerebral Palsy and Multiple Sclerosis.

Side Effects:
See individual drugs.

Overdose Management:

Symptom:
Often extensions of the side effects: stupor, coma, shock like syndrome, respiratory depression, loss of muscle tone, and impaired deep tendon reflexes may also occur.

Treatment:
Symptomatic emesis or gastric lavage (followed by activated charcoal). If necessary, artificial respiration, oxygen administration, pressor agents, and IV fluids may be used. It may be possible to increase the rate of excretion of selected drugs by diuretics (including Mannitol), peritoneal dialysis, or hemodialysis.
Drug Interactions:

CNS:
Depressants (alcohol, barbiturates, sedatives, and hypnotics, and antianxiety agents) increase sedative and respiratory depressant effects.

NURSING CONSIDERATIONS
1. If unable to swallow, crush tablets or empty capsules into a small amount of fruit juice.
2. If skeletal muscle relaxant is to be discontinued after long term use, taper the dose to prevent rebound spasticity, hallucinations, or other withdrawal symptoms.
3. Determine the lowest dosage to treat symptoms.

Assessment
1. Document indications for therapy and characteristics of symptoms. List other agents prescribed and the outcome.
2. Note any prior seizures, may cause loss of seizure control.

Interventions
1. Monitor blood pressure every 4 hours. Supervise ambulation/transfers and ensure safe environment. Sedentary of immobilized patients are more prone to hypotension upon ambulation.
2. Monitor urinary output, evaluate need for drugs to increase excretion rate.
3. Document level of mobility (range of motion) and comfort (pain level) prior to and following drug administration.

Patient/Family Teaching
1. Take with meals to reduce GI (gastrointestinal) upset.
2. If unable to swallow, crush tablets or empty capsules in to a small amount of fruit juice.
3. These drugs may impair mental alertness
4. Do not stop abruptly, may precipitate withdrawal symptoms, rebound
spasticity, and hallucinations.

5. Review additional therapies that may be prescribed for muscle spasms, (heat, rest, exercise or physical therapy) and adhering to prescribed regimen.

6. Increase fluids and bulk in diet to prevent constipation

7. Report if the urine becomes dark, the skin or eyes appear yellow, or itching develops.

8. Avoid alcohol and any other CNS (central nervous system) Depressants, Antihistamines may cause an additive depressant effect.

9. Report persistent nausea, anorexia, or changes in taste perception, as nutritional state may become impaired.

10. Report as scheduled for all lab and medical visits so therapy can be evaluated and drug dosage adjusted.
BACLOFEN/LIORESAL
(Spasticity)

**Indications:** Spasticity, skeletal muscle relaxant (flexor spasms, pain, clonus, muscular rigidity); to manage severe spasticity in patients who do not respond to or can not tolerate oral Baclofen therapy.

**Actions:** Hyperpolarizes fibers to reduce impulse transmission. Appears to reduce transmission of impulses from the spinal cord to skeletal muscle, thus decreasing the frequency and amplitude of muscle spasms in patients with spinal cord lesions.

**Adverse Reactions:**
- **CNS:** Drowsiness, high fever dizziness, headache, weakness, fatigue, paresthesias, hypotonia, confusion, hallucinations, insomnia, dysarthria, seizures with intrathecal use.
- **Cardiovascular:** Hypotension, hypertension.
- **EENT:** Nasal congestion, blurred vision, slurred speech.
- **GI:** Nausea, vomiting, constipation.
- **GU:** Urinary frequency.
- **Metabolic:** Hyperglycemia, weight gain.
- **Musculoskeletal:** Muscle rigidity or spasticity, rhabdomyolysis, muscle weakness.
- **Respiratory:** Dyspnea.
- **Skin:** Rash, pruritus, excessive sweating.
- **Other:** Multiple organ system failure.

**Dosages:**
15 mg - 80 mg/day in adults, increasing slowly starting at 5 mg three times per day, maximum 40 mg/day if less than 8 years of age, maximum 80 mg if greater than 8 years of age. Oral peak is 2 - 3 hours. Oral peak with the orally disintegrating tablets is 1.5 hours. With the intrathecal form the onset is 30 minutes to 1 hour, with a peak of 4 hours and a duration of 4 - 8 hours.

**Nursing considerations:**
- **CNS (central nervous system)** Depressants may increase CNS (central nervous system) depression. Avoid using together.
- Alcohol use may increase CNS (central nervous system) depression. Discourage use together.
- May increase alkaline phosphatase, AST, CK, and glucose levels.
-Contraindicated in patients hypersensitive to drug.
-Orally disintegrating tablets contraindicated in patients hypersensitive to Aspartame (low calorie sweetener) or other components of the drug.
-Use cautiously in patients with impaired renal function or seizure disorder or when spasticity is used to maintain motor function.
-Give oral form with meals or with milk to prevent GI (gastrointestinal) distress.
-Do not use oral drug to treat muscle spasm caused by Rheumatic Disorders, Cerebral Palsy, Parkinson's disease, or stroke because drug's effectiveness for these indications has not been established. Do not give intrathecal injection by IV, IM, subcutaneous, or epidural route.
-Watch for sensitivity reactions, such as fever, skin eruptions, and respiratory distress.
-Expect an increased risk of seizures in patients with seizure disorders.
-The amount of relief determines whether dosage (and drowsiness) can be reduced.
-Do not withdraw drug abruptly after long term use unless severe adverse reactions demand it; doing so may precipitate seizures, hallucinations, or rebound spasticity.
-If patient suddenly requires a large intrathecal dose increase, check for a catheter complication, such as kinking or dislodgement.
-With long term intrathecal use, about 5% of patients may develop intolerance to drug. In some cases, this may be treated by hospitalizing patient and slowly withdrawing drug over a 2 week period.
-Do not confuse Baclofen (antispasmodic) with Bactroban (topical antiinfective).
-Instruct patient to take oral form with meals or milk.
-Tell patients with Phenylketonuria that orally disintegrating tablets contain Phenylalanine (3.9 mg/10 mg tablet and 7.9 mg/20 mg tablet).
-Instruct patient to remove orally disintegrating tablet from blister pack and immediately place on the tongue to dissolve;
then swallow with or without water.
- Tell patient to avoid activities that require alertness until CNS (central nervous system) effects of drug are known. Drowsiness usually is transient.
- Tell patient to avoid alcohol and OTC (over the counter) Antihistamines while taking drug.
- Advise patient to follow Physician's orders regarding rest and physical therapy.
**DANTRIUM/DANTROLENE**  
*(Antispasmodic)*

**Indications:**  
Spasticity and sequelae chronic disorders, such as multiple sclerosis, cerebral palsy, spinal cord injury, stroke; to manage malignant hyperthermic crisis; to prevent or attenuate malignant hyperthermic crisis in susceptible patients who need surgery; to prevent recurrence of malignant hyperthermic crisis

**Action:**  
Acts directly on skeletal muscle to decrease excitation and contraction coupling and reduce muscle strength by interfering with intracellular calcium movement

**Adverse Reactions:**  
**CNS:** Drowsiness, dizziness, malaise, fatigue, seizures, headache, light headedness, confusion, nervousness, insomnia, fever, depression  
**CV:** Tachycardia, blood pressure changes, phlebitis, thrombophlebitis, heart failure  
**EENT:** Excessive lacrimation, speech disturbance, diplopia, visual disturbances  
**GI:** Anorexia, constipation, cramping, dysphagia, metallic taste, severe diarrhea, GI (gastrointestinal) bleeding, vomiting  
**GU:** Urinary frequency, hematuria, incontinence, nocturia, dysuria, crystalluria, urine retention  
**Hematologic:** Leukopenia, thrombocytopenia, lymphocytic lymphoma, anemia  
**Hepatic:** Hepatitis  
**Musculoskeletal:** Muscle weakness, myalgia, back pain  
**Respiratory:** Pleural effusion with pericarditis, pulmonary edema  
**Skin:** Eczematous eruption, pruritus, urticaria, abnormal hair growth, diaphoresis, photosensitivity  
**Other:** Chills

**Dosages:**  
0.5 mg/kg orally every day for 7 days; then 0.5 mg/kg three times a day for 7 days; 1 mg/kg three times a day for 7 days, and finally 2 mg/kg three times a day for 7 days. May increase up to 3 mg/kg 2 to 4 times a day if necessary. Maximum dose is 100 mg four times a day. For adults 25 mg orally daily. Increase by 25 mg increments, up to 100 mg
three to four times a day. Maintain each dosage level for 7
days to determine response. Maximum dose is 400 mg daily.
Available forms are: capsules 25 mg, 50 mg and 100 mg;
injection 20 mg/vial. The oral peak time is 5 hours.

Nursing Considerations: Clofibrate (Atromid S – to reduce cholesterol), Warfarin
(Coumadin – blood thinner) may decrease protein binding of
Dantrium (antispasmodic). Use together cautiously.
-CNS (central nervous system) Depressants may increase CNS
(central nervous system) depression. Avoid using together.
-Estrogens (hormones) may increase risk of hepato toxicity.
Use together cautiously.
-IV Verapamil (Calan – heart) and other Calcium Channel
Blockers may cause hyperkalemia, ventricular fibrillation, and
myocardial depression. Stop Verapamil (Calan – heart) before
giving Dandrium (antispasmodic).
-Vercuronium (used for temporary paralysis) may increase
neuromuscular blockade effect. Use together cautiously.
-Alcohol use may increase CNS (central nervous system)
depression. Discourage use together.
-Sun exposure may cause photosensitivity reactions. Advise
patient to avoid excessive sunlight exposure.
-May increase ALT, AST, alkaline phosphatase, LDH, bilirubin,
and BUN levels.
-Contraindicated for spasms in Rheumatic Disorders and when
spasticity is used to maintain motor function.
-Contraindicated in patients with upper motor neuron
disorders or active hepatic disease.
-Use cautiously in women, patients older than age 35, and
patients with hepatic disease (such as cirrhosis or hepatitis)
or severely impaired cardiac or pulmonary function.
-Start therapy as soon as malignant hyperthermia reaction is
recognized.
-Liver damage may occur with long term use. If benefits do
not occur with in 45 days, stop therapy.
-Obtain liver function test results at start of therapy.
-Prepare oral suspension for single dose by dissolving capsule
contents in juice or other liquid. For multiple doses, use acid
vehicle, and refrigerate. Use within several days.
- Watch for fever, jaundice, severe diarrhea, weakness, and sensitivity reactions, including skin eruptions. Withhold dose and notify Physician.
- Do not confuse Dantrium (antispasmodic) with Daraprim (antiparasitic).
- Instruct patient to take drug with meals or milk in four divided doses.
- Tell patient to eat carefully to avoid choking. Some patients may have trouble swallowing during therapy.
- Warn patient to avoid driving and other hazardous activities until CNS (central nervous system) effects of drug are known.
- Advise patient to avoid combining drug with alcohol or other CNS (central nervous system) Depressants.
- Advise patient to notify Physician if skin or eyes turn yellow, skin itches, or fever develops.
- Tell patient to avoid photosensitivity reactions by using sunblock and wearing protective clothing, to report abdominal discomfort or GI (gastrointestinal) problems immediately, and to follow Physician’s orders regarding rest and physical therapy.
FLEXERIL/CYCLOBENAPRINE HYDROCHLORIDE
(Antispasmodic)

Indications: Adjunct to rest and physical therapy to relieve muscle spasm from acute, painful musculoskeletal conditions.

Actions: Unknown. Relieves skeletal muscle spasm of local origin without disrupting muscle function.

Adverse Reactions: CNS: Dizziness, drowsiness, seizures, headache, insomnia, fatigue, asthenia, nervousness, confusion, paresthesia, depression, dysarthria, ataxia, syncope.
CV: Arrhythmias, palpitations, hypotension, tachycardia, vasodilatation.
EENT: Visual disturbances, blurred vision.
GI: Dry mouth, dyspepsia, abnormal taste, constipation, nausea.
GU: Urine retention, urinary frequency.
Skin: Rash, urticaria, pruritus, sweating.

Dosages: 5 mg orally three times a day. Based on response, dose may be increased to 10 mg three times a day. Do not exceed 60 mg/day. Use for longer than 2 or 3 weeks is not recommended. Available form is tablet in 5 mg and 10 mg. The onset is in 1 hour, the peak is 4 hours and the duration is 2 to 24 hours.

Nursing Considerations: CNS (central nervous system) Depressants may increase CNS (central nervous system) depression. Avoid using together.
-Guanethidine (no longer available in the US) may block antihypertensive effect. Monitor patient's blood pressure.
-MAO (Monoamine Oxidase) Inhibitors may cause hyperpyretic crisis, seizures, and death when MAO (Monoamine Oxidase) Inhibitors are used with Tricyclic Antidepressants; may also occur with Flexeril (antispasmodic). Avoid using within 2 weeks of MAO (Monoamine Oxidase) Inhibitor therapy.
-Naproxen (Naprosyn - antiinflammatory) may increase drowsiness. Make patient aware of this interaction.
-Tramadol (Ultram - pain) may increase risk for seizures. Use together cautiously.
-Alcohol use may increase CNS (central nervous system) depression. Discourage use together.
- Contraindicated in patients hypersensitive to drug; and in those with hyperthyroidism, heart block, Arrhythmias, acute recovery phase of an MI (myocardial infarction/heart attack).
- Use cautiously in elderly or debilitated patients and in those with history of urine retention, Acute Angle Closure Glaucoma, or Increased Intraocular Pressure.
- Safety and effectiveness in children has not been established under the age of 15.
- Flexeril (antispasmodic) may cause toxic reactions similar to those of Tricyclic Antidepressants. Observe same precautions as when giving Tricyclic Antidepressants.
- Monitor patient for nausea, headache, and malaise, which may occur if drug is stopped abruptly after long term use, overdose, including cardiac toxicity.
- Do not confuse Flexeril (antispasmodic) with Floxin (antiinfective).
- Advise patient to report urinary hesitancy or urine retention. If constipation is a problem, suggest that patient increase fluid intake and use a stool softener.
- Warn patient to avoid activities that require alertness until CNS (central nervous system) effects of drug are known.
- Warn patient not to combine with alcohol or other CNS (central nervous system) Depressants, including OTC (over the counter) cold or allergy medications.
- Instruct patient not to split the generic 10 mg tablets because of the high risk of inconsistent doses.
SOMA/CARISOPRODOL

(Antispasmodic)

Indications: Adjunctive treatment for acute, painful musculoskeletal conditions

Actions: May modify central perception of pain without modifying pain reflexes. Muscle relaxant effects may be related to sedative properties

Adverse reactions: CNS: Drowsiness, dizziness, vertigo, ataxia, tremor, agitation, irritability, headache, depressive reactions, fever, insomnia, syncope

CV: Orthostatic hypotension, tachycardia, facial flushing

GI: Nausea, vomiting, epigastric distress, hiccups

Respiratory: Asthmatic episodes

Skin: Erythema Multiforme, pruritus, rash

Other: Angioedema, anaphylaxis

Dosages: 350 mg orally three times a day and at bedtime. Available form is tablets in 350 mg. Onset is in 30 minutes, peak is in 4 hours and duration is 4 to 6 hours.

Nursing Considerations: CNS (central nervous system) Depressants may increase CNS (central nervous system) depression.
- Alcohol use may increase CNS (central nervous system) depression. Discourage use together.
- May increase eosinophil count.
- Contraindicated in patients hypersensitive to related compounds (such as Meprobamate - Equanil - antianxiety or Tybamate - Solicen - antineurosis) and in those with intermittent porphyria.
- Use cautiously in patients with impaired hepatic or renal function.
- Safety and effectiveness in children younger than age 12 have not been established.
- Watch for idiosyncratic reactions after first to fourth doses (weakness, ataxia, visual and speech difficulties, fever, skin eruptions, and mental changes) and for severe reactions, including bronchospasm, hypotension, and anaphylactic shock. After unusual reactions, withhold dose and notify Physician immediately.
- Record amount of relief to help Physician determine whether dosage can be reduced.
- Do not stop drug abruptly, which may cause mild withdrawal effects, such as insomnia, headache, nausea, or abdominal cramps.
- Drug may be habit forming.
- Warn patient to avoid activities that require alertness until CNS (central nervous system) effects of drug are known. Drowsiness is transient.
- Advise patient to avoid combining drug with alcohol or other CNS (central nervous system) Depressants.
- Tell patient to ask Physician before using OTC (over the counter) cold or hay fever remedies.
- Instruct patient to follow Physician’s orders regarding rest and physical therapy.
- Advise patient to avoid sudden changes in posture if dizziness occurs.
- Tell patient to take drug with food or milk if GI (gastrointestinal) upset occurs.
**ZANAFLEX/TIZANIDINE**
*(Spasticity)*

**Indications:** Acute and intermittent management of increased muscle tone with spasticity

**Action:** Unknown. Acts as an alpha2 agonist. May reduce spasticity by increasing presynaptic inhibition of motor neurons at the level of the spinal cord

**Adverse Reactions:**
- CNS: Somnolence, sedation, asthenia, dizziness, speech disorder, dyskinesia, nervousness, hallucinations
- Cardiovascular: Bradycardia, hypotension
- EENT: Amblyopia, pharyngitis, rhinitis
- GI: Vomiting, constipation, dry mouth
- GU: Urinary tract infection (UTI), urinary frequency
- Hepatic: Hepatic injury
- Other: Infection, flu syndrome

**Dosages:** 4 mg orally every 6 to 8 hours as needed to maximum of three doses in 24 hours. Dosage can be increased gradually in 2 mg to 4 mg increments, reaching optimum dose over 2 to 4 weeks. Maximum is 36 mg daily. The available forms are: capsules in 2 mg, 4 mg, and 6 mg; tablets in 2 mg and 4 mg. The peak of the drug is in 1 to 2 hours and the duration in 3 to 6 hours.

**Nursing Considerations:** Given with Carbamazepine (Tegretol - anticonvulsant) may develop jaundice after 2 months of treatment.
- Acetaminophen (Tylenol) may delay Tylenol absorption time. Monitor patient for clinical effect.
- Antihypertensives, other Alpha Agonists such as Clonidine (anti hypertensive may cause hypotension; monitor patient closely. Avoid using together.
- Baclophen (antispasmodic), Benzodiazepines, other CNS (central nervous system) Depressants may have additive CNS (central nervous system) Depressant effects. Avoid using together.
- CYP1A2 inhibitors (Amiodarone - Cordarone - heart; Acyclovir - Zovirax - antiviral; Cimetidine - Tagamet - stomach; Ciprofloxacin - Cipro - antibiotic; Famotidine - Pepcid - stomach; Fluoroquinolones, Fluvoxamine - Luvox - antidepressant;Mexiletine - Mexitil - heart; Propafenone -
Rythmol – heart; Ticlodipine – Ticlid – antiplatelet; Verapamil – Calan – heart; Zileuton – asthma) may cause significant increases in Zanaflex (antispasmodic) levels. Use together should be avoided; use of Cipro (antibiotic) or with Zanaflex (antispasmodic) is contraindicated.

- Alcohol use may increase CNS (central nervous system) depression. Discourage use together.
- May increase AST and ALT levels.
- Contraindicated in patients hypersensitive to drug.
- Use of potent CYP1A2 inhibitors Cipro (antibiotic) and Luvox (antidepressant) with Zanaflex (antispasmodic) is contraindicated.
- Use cautiously in patients who are taking Antihypertensives, in those with renal and hepatic impairment, and in elderly patients.
- Safety and effectiveness in children has not been established.
- Do not confuse Zanaflex (antispasmodic) with Tiagabine (Gabatril – anticonvulsant); both have 4 mg starting doses.
- The capsules and tablets are bioequivalent only if taken on an empty stomach.
- Obtain liver function test results before treatment; during treatment at 1, 3, and 6 months; and then periodically thereafter.
- Caution patient to avoid alcohol and activities that require alertness. Drug may cause drowsiness.
- Inform patient that dizziness upon standing quickly can be minimized by rising slowly and avoiding sudden position changes.
CARNITINE DEFICIENCY IN EPILEPSY
RISK FACTORS AND TREATMENT

Studies have shown that plasma Carnitine levels are significantly lower in patients taking Valproic acid (Depakote – anticonvulsant). Carnitine deficiency in epilepsy results from a variety of etiologic factors including underlying metabolic diseases, nutritional inadequacy and specific drug effects.

The total body Carnitine level is 90%, found in muscle tissue, and the concentration Carnitine in muscle tissue is as much as 10 times higher than in blood.

Plasma Carnitine deficiency appears to be more common in young patients with multiple disabilities than in relatively healthy adults.

Plasma Carnitine levels are decreased in many patients with epilepsy. They are lowest in patients taking Valproate (Depakote – anticonvulsant) plus other anticonvulsant drugs, but may also be decreased in patients taking Valproate (Depakote – anticonvulsant) alone and in patients not taking Valproate (Depakote – anticonvulsant), but taking other anticonvulsants, such as Phenobarbital, Phenytoin, or Carbamazepine.

The etiology of Carnitine deficiency in patients with epilepsy may be related to nutritional factors, inborn errors of metabolism, or the effects of drugs and other diseases. In some patients, it may reflect the combined effect of several factors.

Carnitine deficiency has been reported in patients with seizures who have a variety of underlying metabolic disorders. These include defects in fatty acid metabolism, Mitochondrial Disorders, such as Mitochondrial Encephalopathy, Lactic Acidosis, and stroke - like episodes. Indeed, a patient with one or more of these inborn errors of metabolism may decompensate or become comatose when given a drug such as Valproate (Depakote – anticonvulsant) that alters Carnitine Metabolism.

Dietary Carnitine is found in highest concentration in products derived from red meat and milk, so patients whose diets are deficient in these products may be at risk for nutritional Carnitine deficiency. Products used in tube feedings may or may not include Carnitine, so clinicians need to check the label of whatever product is being used in order to prevent nutritional Carnitine deficiency in patients who
rely on these products for most or all of their nutrition.

Institutionalized or severely handicapped patients with multiple disabilities, whose dietary intake of Carnitine may be deficient for any or all of these reasons may be particularly likely to have a Carnitine deficiency.

Valproate is a fatty acid and so would be expected to have effects on fatty acid metabolism. The weight gain sometimes associated with Valproate (Depakote – anticonvulsant) therapy has been attributed to inhibition of fatty acid metabolism.

A study suggested that the etiology of Carnitine deficiency in Valproate (Depakote – anticonvulsant) treated patients might be related in part to increased renal excretion of Carnitine.

Liver failure can be a side effect of Valproate (Depakote – anticonvulsant) therapy. Signs and symptoms include anorexia, nausea, vomiting, lethargy, edema, fever, coma, and seizures.

Risk factors for Carnitine deficiency
Young age (less than 10 years old)
Multiple neurological disabilities (mental retardation, blindness, cerebral palsy, microcephaly)
Non-ambulatory status
Underweight (decreased weight for height)
Diet low in meat and dairy products
On tube feeding
Taking multiple anticonvulsant drugs including Valproate
High ammonia level
Low blood sugar
Metabolic acidosis

The effects of Carnitine treatment on signs and symptoms in children with two or more of the risk factors are as follows: improvement was noted in symptoms of apathy, lethargy, listlessness, anorexia, constipation, nausea, vomiting, weakness and hypotonia, and some had fewer seizures. The conclusions of one particularly study was two fold: Carnitine deficiency is not uncommon in patients with epilepsy and some patients appear to benefit from Carnitine treatment.
CARNITOR/LEVOCARNITINE
(Carnitine Deficiency)

Indication: For the treatment of primary systemic Carnitine deficiency, acute and chronic treatment of patients with an inborn error of metabolism which results in secondary Carnitine deficiency.

Action: Increased Carnitine levels and reversal of complications associated with impaired fat utilization and energy production, facilitates long chain fatty acid entry into the cellular mitochondria, therefore, delivering substrate for oxidation and subsequent energy production, it alleviates secondary Carnitine deficiency in patients with inborn errors of metabolism decreasing the accumulation of toxic organic acids.

Adverse Reactions: CNS: Anxiety, depression, dizziness, hypertonia, insomnia, vertigo, paresthesia
Cardiovascular: Arrhythmia, atrial fibrillation, cardiovascular disorder, EKG abnormalities, hemorrhage, hypertension, hypotension, palpitations, tachycardia, vascular disorder
Respiratory: Bronchitis, dyspnea, respiratory disorder
EENT: Increased cough, pharyngitis, rhinitis, sinusitis, amblyopia, eye disorder, taste perversion
GI: Anorexia, constipation, diarrhea, dyspepsia, gastrointestinal disorder, melena, nausea, stomach, lack of muscle tone, vomiting, weight increase or decrease
GU: Urinary tract infection, kidney failure
Skin: Rash, pruritus
Other: Peripheral edema, leg cramps, myalgia, fever, flu symptoms, infection

Dosages: 330 mg tabletta, depending on blood levels

Nursing Considerations: What other causes for Carnitine deficiency? - a disturbance to the normal mechanisms involved in maintaining Carnitine levels, dietary restrictions of red meats and dairy products, impaired synthesis of Carnitine by the kidney or liver, or excessive loss due to renal dysfunction.
Who is at risk for developing Carnitine deficiency? - fatty acid oxidation defects, mitochondrial myopathy, premature birth, administration of Valproic acid (Depakote - anticonvulsant).
What symptoms indicate Carnitine deficiency? - cardiomyopathy,
muscle weakness, lethargy, poor muscle tone, seizures, low levels of activity, developmental delay, slow growth.

How is Carnitine deficiency detected? - serum, muscle, and/or urine samples may be used to diagnose the deficiency. No report of over dosage at this time.
CENTRAL NERVOUS STIMULANTS
(for Attention Deficit Disorder)

Major Uses
Amphetamines and amphetamine like drugs may suppress appetite, promote weight reduction in exogenous obesity, and supply short term adjunctive therapy for weight control and dieting.
Deanol, Dextroamphetamine, Methamphetamine, Methylphenidate, and Pemoline are used as therapeutic adjuncts in minimal brain dysfunction in children, such as hyperkinesias.
Dextroamphetamine and Methylphenidate are used to treat narcolepsy.

Mechanisms of Action
Amphetamines and amphetamine like drugs, caffeine, Methylphenidate and Pemoline are Sympathomimetics whose main sites of activity appear to be the cerebral cortex and the reticular activating system. They probably promote nerve impulse transmission by releasing stored Norepinephrine from nerve terminals in the brain.
In children with hyperkinesias, Amphetamines have a paradoxical calming effect that is probably related to the actions of the drug on CNS (central nervous system) neurotransmitters. The mechanism by which Amphetamines produce mental and behavioral effects in children, however, has not been established.
Deanol probably elicits a CNS (central nervous system) stimulating effect by increasing brain levels of choline – a precursor of acetylcholine.

Absorption, distribution, metabolism, and excretion
Cerebral Stimulants are readily absorbed from the gastrointestinal tract. They are well distributed to most body tissues, with high concentrations in the brain and cerebrospinal fluid.
Amphetamines and amphetamine like drugs are excreted by the kidneys, largely unchanged, in about 3 hours. They and Fenfluramine Hydrochloride are excreted more readily in acidic urine than they are in alkaline urine.
Caffeine, Deanol, and Methylphenidate are partially metabolized by the liver and excreted by the kidneys.
Pemoline probably undergoes the greatest metabolic change of these drugs, with more than 50% being metabolized to Pemoline dione, an active metabolite, before being excreted by the kidneys.
Onset and Duration
Onset is usually within 1 to 2 hours. Duration is from 4 to 10 hours, with most drugs requiring multiple doses for continued anorexigenic effect. Some are longer acting (6 to 12 hours).

Prevention
Educate the patient concerning the misuse of caffeine and Amphetamines
Prevent medically induced amphetamine addiction by:
-Teaching the obese patient who is taking Amphetamines to report such symptoms as nervousness, insomnia, and cardiac palpitations.
-Observing the depressed patient who is being treated with Amphetamines for insomnia, loss of appetite, restlessness and agitation.
-Watching the patient on powerful central nervous system stimulants such as Dextroamphetamine, which is twice as potent as Amphetamine.
Dextroamphetamine, in large doses, is more likely to cause fatigue, mental depression, increased blood pressure, cyanosis, respiratory failure, disorientation, hallucinations, convulsions, and coma.
Alert the Physician to drug induced symptoms you have observed. He may want to stop medication.

Patient Care
Be aware of your own attitude toward drug addiction and abuse. Respect the amphetamine addict as a human being, his motivation will be increased. Be straight forward with him. Be firm in setting limits, but do not irritate or humiliate him unnecessarily when enforcing them.
Make a special effort to establish a supportive relationship with the addicted patient during his withdrawal from Amphetamines. This critical stage of rehabilitation can have a favorable effect on the patient's final recovery.
**CONCERTA, RITALIN/METHYLPHENIDATE HYDROCHLORIDE**  
(ADHD, CNS Stimulant)

**Indication:** Attention Deficit Hyperactivity Disorder (ADHD)

**Action:** Releases nerve terminal stores of Norepinephrine, promoting nerve impulse transmission. At high doses, effects are mediated by Dopamine.

**Adverse Reactions:**
- **CNS:** Nervousness, headache, insomnia, seizures, tics, dizziness, akathisia, dyskinesia, drowsiness, mood swing
- **CV:** Palpatations, tachycardia, arrhythmias, hypertension
- **EENT:** Pharyngitis, sinusitis
- **GI:** Nausea, abdominal pain, anorexia, decreased appetite, vomiting
- **Hematologic:** Thrombocytopenia, purpura, leukopenia, anemia
- **Metabolic:** Weight loss
- **Respiratory:** Cough, upper respiratory tract infection
- **Skin:** Exfoliative dermatitis, erythema multiforme, rash, urticaria, application site irritation (redness, swelling, papules)
- **Other:** Viral infection

**Dosages:**
- 5 mg orally twice/day immediate release form before breakfast and lunch, increasing by 5 mg to 10 mg at weekly intervals as needed until an optimum daily dose of 2mg/kg is reached, not to exceed 60 mg/day. For children age 6 and older. Adolescents age 13 to 17, 18 mg orally extended release once daily in the morning. Adjust dosage by 18 mg at weekly intervals to a maximum of 72 mg orally not to exceed 2 mg/kg once daily in the morning. Each form of the drug the dosage may vary slightly. Available forms: oral solution 5 mg/ml and 10 mg/ml; tablets (chewable) 2.5 mg, 5 mg, and 10 mg; tablets (Ritalin, Methylin) 5 mg, 10 mg and 20 mg; extended release capsules Metadate CD 10 mg, 20 mg, and 30 mg, capsules Ritalin LA 20 mg, 30 mg, and 40 mg, tablets Concerta 18 mg, 27 mg, 36 mg and 54 mg, tablets Metadate ER, Methylin ER 10 mg and 20 mg; sustained release tablets Ritalin SR 20 mg;
Transdermal Patch 10 mg, 15 mg, 20 mg, and 30 mg. The peak range for the drug varies from $1\frac{1}{2}$ to 8 hours, with a duration of from 8 to 14 hours.

Nursing Considerations: Anticonvulsants (such as Phenobarbital (anticonvulsant), Phenytoin (Dilantin - anticonvulsant), Primidone (Mysoline - anticonvulsant), SSRI’s (Selective Serotonin Reuptake Inhibitors), Tricyclic Antidepressants (Imipramine - Tofranil - antidepressant), (Clomipramine - Anafranil - antidepressant), (Desipramine - Norpramin - antidepressant), Warfarin (Coumadin - blood thinner) may increase level of these drugs. Monitor patient for adverse reactions and decrease dose of these drugs as needed. Monitor drug levels (or coagulation times if patient is also taking Warfarin (Coumadin - blood thinner).

- Centrally acting alpha2 agonists, Clonidine (antihypertensive) may cause serious adverse effects. Avoid using together.
- Centrally acting Antihypertensives may decrease antihypertensive effect. Monitor blood pressure.
- MAO (Monoamine Oxidase) Inhibitors may cause severe hypertension or hypertensive crisis. Avoid using within 14 days of MAO (Monoamine Oxidase) Inhibitor therapy.
- Caffeine may increase amphetamine and related amine effects. Discourage use together.
- May decrease hemoglobin level and hemocrit.
- May decrease platelet and WBC counts.
- Contraindicated in patients hypersensitive to drug and in those with glaucoma, motor tics, family history or diagnosis of Tourette’s Syndrome, or history of marked anxiety, tension, or agitation. Also contraindicated within 14 days of MAO (Monoamine Oxidase) Inhibitor therapy. Avoid use in patients with structural cardiac abnormalities.
- Because it does not dissolve, Concerta (CNS - central nervous system, stimulant for ADHD (Attention Deficit Hyperactivity Disorder) is not recommended in patients with a history of Peritonitis or with severe GI (gastrointestinal) narrowing (such as small bowel inflammatory disease, short gut syndrome caused by adhesions or decreased transit time, Cystic Fibrous, chronic intestinal pseudoobstruction, or Meckel’s diverticulum.)
- Use cautiously in patients with a history of seizures, EEG abnormalities, or hypertension, and in patients who have underlying medical conditions might be compromised by increases in blood pressure or heart rate, such as those with preexisting Hypertension, Heart Failure, recent MI (myocardial infarction/heart attack), or Hyperthyroidism.
- Use cautiously in patients who are emotionally unstable or who have a history of drug dependence or alcoholism.
- Drug may trigger Tourette's Syndrome in children.
- Monitor patient, especially at start of therapy.
- Do not use drug to prevent fatigue or treat severe depression.
- Observe patient for signs of excessive stimulation.
- Monitor blood pressure.
- Check CBC, differential, and platelet counts with long term use, particularly if patient shows signs or symptoms of hematologic toxicity (fever, sore throat, easy bruising).
- Monitor height and weight in children on long term therapy. Drug may delay growth spurt, but children will attain normal height when drug is stopped.
- Monitor patient for tolerance or psychological dependence.
- Chewable tablets contain Phenylalanine (amino acid).
- Do not confuse Ritalin (for ADHD – Attention Deficit Hyperactivity Disorder) with Rifadin (for pulmonary tuberculosis).
- Tell patient or caregiver to give last daily dose at least 6 hours before bedtime to prevent insomnia and after meals to reduce appetite suppressant effects.
- Warn patient against chewing sustained release tablets.
- Metadate CD (another name for Concerta and or Ritalin) or Ritalin LA, all for ADHD (Attention Deficit Hyperactivity Disorder) may be swallowed whole, or the contents of the capsule may be sprinkled onto a small amount of cool applesauce and taken immediately.
- Warn patient to take chewable tablet with at least 8
ounces of water. Not using enough water to swallow tablet may cause the tablet to swell and block the throat causing choking.

-Caution patient to avoid activities that require alertness or good psychomotor coordination until CNS (central nervous system) effects of drug are known.
-Warn patient with seizure disorder that drug may decrease seizure threshold. Urge him to notify Physician if seizure occurs.
-Advise patient to avoid beverages containing caffeine while taking drug.
-Tell parent to apply patch immediately after opening; do not use if pouch seal is broken. Press firmly in place for about 30 seconds using the palm of your hand, being sure there is good contact with the skin – especially around the edges. Once applied correctly, the child may shower, bathe, or swim as usual.
-Inform parent if patch comes off, a new one may be applied on a different site, but the total wear time for that day should be 9 hours. Upon removal, fold patch in half so the sticky sides adhere to itself, then flush down toilet or dispose of in a lidded container.
-Tell parent, if the applied patch is missing, to ask the child when or how the patch came off.
-Encourage parent to use the application chart provided with patch carton to keep track of application and removal.
-Tell parent to remove patch sooner than 9 hours if the child has decreased evening appetite or has difficulty sleeping.
-Tell parent the effects of the patch lasts for several hours after its removal.
-Warn parent and patient to avoid exposing patch to direct external heat sources, such as heating pads, electric blankets, and heated water beds.
-Tell parent to notify Physician if the child develops bumps, swelling, or blistering at the application site or is experiencing blurred vision or other serious side effects.
FOCALIN/DEXMETHYLPHENIDATE HYDROCHLORIDE
(ADHD - CNS Stimulant)

Indication: Attention Deficit Hyperactivity Disorder (ADHD)
Action: Blocks presynaptic reuptake of Norepinephrine and Dopamine and increases their release, increasing concentration in the synapse
Adverse Reactions: CNS: Headache, anxiety, feeling jittery, nervousness, insomnia, fever, dizziness
CV: Tachycardia
EENT: Throat pain
GI: Anorexia, abdominal pain, nausea, dyspepsia, dry mouth
Musculoskeletal: Twitching (motor or vocal tics)
Other: Hypersensitivity reactions

Dosages: Immediate release tablets
Adults and children age 6 and older: for patients who are not taking Methylphenidate (Concerta/Ritalin - same drug), initially, 2.5 mg twice a day, given at least 4 hours apart. Increase weekly by 2.5 mg to 5 mg daily, up to a maximum of 20 mg daily in divided doses. For patients who are taking Concerta/Ritalin, initially give half the current Concerta/Ritalin dosage, up to a maximum of 20 mg daily in divided doses. Extended release tablets. Adults - for patients who are not taking Focalin or Concerta, or who are on stimulants other than Concerta, give 10 mg, once daily in the morning. May adjust on weekly increments of 10 mg to a maximum dose of 20 mg daily. For patients who are now taking Concerta, initially give half the total dose of Concerta. Patients who are taking the immediate release form of Focalin may be switched to the same daily dose of extended release form. Maximum daily dose is 20 mg. Children ages 6 and older: For patients who are not now taking Focalin or Concerta, or who are on stimulants other than Concerta, give 5 mg once daily in the morning to a maximum daily dose of 20 mg. For patients who are now taking Concerta, initially give half the total daily dose of Concerta. Patients who are now taking the immediate release form of Focalin may be switched to the same daily dose of extended release form. Maximum daily dose is 20 mg. Available forms are the extended release in 5 mg, 10 mg,
and 20 mg and the tablets are available in 2.5 mg, 5 mg, and 10 mg. The peak time for this drug is 1 - 1½ hours.

Nursing Considerations: Antacids, Acid Suppressants may alter the release of Extended release form. Avoid using together.
-Anticoagulants, Phenobarbital (Luminal), Phenytoin (Dilantin), Primidone (Mysoline) all anticonvulsants, Tricyclic Antidepressants may inhibit metabolism of these drugs. May need to decrease dosage of these drugs; monitor drug levels.
-Antihypertensives may decrease effectiveness of these drugs. Use together cautiously; monitor blood pressure.
-Clonidine (Catapres - antihypertensive), other centrally acting alpha agonists may cause serious adverse effects. Use together cautiously.
-MAO (Monoamine Oxidase) Inhibitors may increase risk of hypertensive crisis. Using together within 14 days of MAO (Monoamine Oxidase) Inhibitor therapy is contraindicated.
-Contraindicated in patients hypersensitive to Concerta (for ADHD - attention deficit hyperactivity disorder) or other components.
-Contraindicated in patients with severe Anxiety, Tension, or Agitation; Glaucoma, or Motor Tics or a family history or diagnosis of Tourette’s Syndrome, or within 14 days of MAO (Monoamine Oxidase) Inhibitor therapy.
-Use cautiously in patients with a psychiatric illness, Bipolar Disorder, Depression, or family history of Suicide; Seizures, Hypertension, Hyperthyroidism, Heart Failure, recent MI (myocardial infarction/heart attack), or a history of Drug or Alcohol Abuse.
-Do not use in children or adolescents with structural cardiac abnormalities or other serious heart problems.
-Diagnosis of ADHD (Attention Deficit Hyperactivity Disorder) must be based on complete history and evaluation of the patient by psychological and educational experts.
-Obtain a detailed patient history, including a family history for Mental Disorders, Family Suicide, Ventricular Arrhythmias or Sudden Death.
-Refer patient for psychological, educational, and social support.
-Periodically reevaluate the longterm usefulness of the drug.
- Monitor CBC and differential and platelet counts during prolonged therapy.
- Do not use for severe depression or normal fatigue states.
- Stop treatment or reduce if symptoms worsen or adverse reactions occur.
- Long term stimulant use may temporarily suppress growth. Monitor children for growth and weight gain. If growth slows or weight gain is lower than expected, stop drug.
- Routinely monitor blood pressure and pulse.
- Monitor patient for signs of drug dependence or abuse.
- If seizures occur, stop drug.
- Stress the importance of taking the correct dose of drug at the same time every day. Report accidental overdose immediately.
- Warn patient the misuse of Amphetamines can have serious effects including sudden death.
- Advise patients unable to swallow capsules to empty the contents of the capsule onto a spoonful of applesauce and eat immediately.
- Tell patient not to crush, cut, or chew the contents of the extended release beaded capsule.
- Advise parents to monitor child for medication abuse or sharing. Also inform parents to watch for increased aggression or hostility and to report worsening behavior.
- Advise parents to monitor height and weight and to tell the Physician if they suspect growth is slowing.
- Caution patient to expect blurred vision or difficulty with accommodation and to exercise caution while performing activities that require a clear visual field. Advise patient to report blurred vision to the Physician.
STRATTERA/AMOMOXETINE HYDROCHLORIDE
(Attention Deficit Disorder)

Indication: Attention deficit hyperactivity disorder (ADHD)
Action: May be related to selective inhibition of the presynaptic
Norepinephrine transporter
Adverse Reactions: CNS: Headache, insomnia, dizziness, somnolence, crying,
irritability, mood swings, pyrexia, fatigue, sedation, depression,
tremor, early morning awakening, paresthesia, abnormal dreams,
sleep disorder
CV: Orthostatic hypotension, tachycardia, hypertension,
palpitations, hot flashes
EENT: Ear infection, rhinorrhea, sore throat, nasal congestion,
nasopharyngitis, sinus congestion, mydriasis, sinusitis
GI: Abdominal pain, constipation, dyspepsia, nausea, vomiting,
decreased appetite, gastroenteritis, dry mouth, flatulence
GU: Urinary retention, urinary hesitation, difficulty in
micturation, dysmenorrhea, delayed menses, menstrual disorder,
prostatitis
Metabolic: Weight loss
Musculoskeletal: Arthralgia, myalgia
Respiratory: Cough, upper respiratory tract infection
Skin: Dermatitis, pruritus, increased sweating
Other: Influenza, rigors
Dosages: 40 mg daily for adults children and adolescents who weigh more
than 154 lb. Increase after at least 3 days to a total of 80
mg/day, as a single dose in the morning or two evenly divided
doses in the morning and late afternoon or early evening. After
2 to 4 weeks, increase total dose to a maximum of 100 mg, if
needed. Children who weigh 70 kg or less: initially 0.5 mg/kg
daily; increase after a minimum of 3 days to a target total daily
dose of 1.2 mg/kg as a single dose in the morning or two evenly
divided doses in the morning and late afternoon or early evening.
Do not exceed 1.4 mg/kg or 100 mg daily, whichever is less.
Adjust a dose - in patients with moderate hepatic impairment,
reduce to 50% of the normal dose; in those with severe hepatic
impairment, reduce to 25% of the normal dose. Poor
metabolizers of CYP2D6 may require a reduced dose. In
children who weigh less than 70 kg, adjust dosage to 0.5 mg/kg daily and increase to 1.2 mg/kg daily if symptoms do not improve after 4 weeks and if first dose is tolerated. In children and adults who weigh more than 70 kg, start at 40 mg daily and increase to 80 mg daily if symptoms do not improve after 4 weeks and if first dose is still tolerated. Available form is capsules at 10 mg, 18 mg, 25 mg, 40 mg, 60 mg, 80 mg, and 100 mg. It has a rapid onset and it peaks in 1 - 2 hours.

Nursing Considerations: Albuterol (used in breathing treatments) may increase CV (cardiovascular) effects. Use together cautiously.

-MAO (Monoamine Oxidase) Inhibitors may cause hyperthermia, rigidity, myoclonus, autonomic instability with possible rapid fluctuations of vital signs, and mental status changes. Avoid use within 2 weeks of MAO (Monoamine Oxidase) Inhibitor.

-Pressor agents may increase blood pressure. Use together cautiously.

-Strong CYP2D6 inhibitors (Paroxetine (Paxil - antidepressant), Fluoxetine (Prozac - antidepressant), Quinidine (heart) may increase Strattera (for ADD - Attention Deficit Disorder) level. Reduce first dose.

-Contraindicated in patients hypersensitive to Strattera (for ADD - Attention Deficit Disorder) or to components of drug, in those who have taken an MAO (Monoamine Oxidase) Inhibitor within the past 2 weeks, and in those with glaucoma.

-Use cautiously in patients with hypertension, tachycardia, or CV (cardiovascular) or cerebrovascular disease.

-Safety and efficacy have not been established in patients younger than 6.

-Use drug as part of a total treatment program for ADHD (Attention Deficit Hyperactivity Disorder), including psychological, educational, and social intervention.

-Monitor children and adolescents closely for worsening of condition, agitation, irritability, suicidal thinking or behaviors, and unusual changes in behavior, especially the first few months of therapy or when the dosage is increased or decreased.

-Patients taking drug for extended periods must be reevaluated periodically to determine drug’s usefulness.

-Monitor growth during treatment. If growth or weight gain is
unsatisfactory, consider interrupting therapy.
- Severe liver injury may occur and progress to liver failure.

Notify Physician at any sign of liver injury: yellowing of the skin or the sclera of the eyes, pruritus, dark urine, upper right sided tenderness or unexplained flulike symptoms.
- Monitor blood pressure and pulse at baseline, after each dose increase, and during treatment periodically.
- Monitor for urinary hesitancy or retention.
- Patient can stop drug without tapering off.
- Advise parents to call Physician immediately about unusual behavior or suicidal thoughts.
- Tell patient to use caution when operating a vehicle or machinery until the effects of drug are known.
CHOLINERGIC BLOCKERS
(PARASYMPATHOLYTICS)

Cholinergic blockers inhibit the action of acetylcholine released by parasympathetic and some parasympathetic nerves. Because parasympathetic nerves innervate many organs, parasympatholytic action can be widespread. The effects of parasympatholytics are typically opposite those of parasympathetic stimulation. For example, parasympathetic (vagal) stimulation of the heart decreases heart rate, whereas Atropine, a parasympathetic drug, increases heart rate.

Several of these drugs (for example, Benztropine (Cogentin) and Trihexyphenidyl - antidyskinetic drug) can enter the brain, where they antagonize the actions of cerebral acetylcholine. The cholinergic blockers help to control the clinical effects of Parkinsonism (a disease partly attributable to over activity of certain cholinergic pathways in the brain) and dyskinesias associated with the use of major Tranquilizers.

Parasympatholytic drugs are not organ specific. The administration of Atropine to reverse severe bradycardia, for example, can dry oral and respiratory secretions. Likewise, the use of Benztropine (Cogentin) for Parkinsonism can produce urinary retention, especially in men with prostatic hypertrophy.

Major Uses
Atropine may be used for poisoning due to organic phosphate insecticides and certain mushrooms.
Atropine and Scopolamine, as preanesthetic medications, are used to reduce salivary and respiratory secretions.
Benztropine (Cogentin), Biperiden (Akineton - antiparkinsonism), Cyclimine (Pagitane - relief of spasms), Procyclidine (Kemadrin - antiparkinsonism), and Trihexyphenidyl (antidyskinetic) are used to treat Parkinsonism and extrapyramidal reactions associated with the use of Neuroleptics.

Mechanism of Action
Cholinergic blockers generally are well absorbed from the gastrointestinal (GI) tract. They are widely distributed to body organs innervated by the parasympathetic nervous system and excreted unchanged in the urine.
Atropine (increases heart rate and dries secretions), Benztropine (Cogentin - antiparkinsonism), Biperiden (Akineton - antiparkinsonism), Scopolamine (dries secretions), and Trihexyphenidyl (antidyskinetic) are more likely to penetrate the central nervous system than the other cholinergic blockers.

**Onset and Duration**
All cholinergic blockers take effect within 30 minutes when injected IM or subcutaneously, and within 30 to 60 minutes when given orally.

The duration of these agents (except Benztropine - Cogentin) is from 2 to 6 hours when given IM or subcutaneously, and from 4 to 6 hours when given orally. Effects of large doses can last as long as 24 hours. Benztropine's (Cogentin) duration of action is 24 hours after IM, subcutaneous or oral administration.
**BOTOX**  
**(CONTROL DROOLING)**

**Indications:** Excessive drooling and muscle spasticity, dystonia, torticollis, hemifacial spasm

**Actions:** Blocks neuromuscular transmission by binding to receptor sites on motor nerve terminals and inhibiting acetylcholines release, thereby causing localized muscle denervation. As a result, local muscle paralysis occurs, which leads to muscle atrophy and reinnervation due to development of new acetylcholines receptors.

**Adverse Reactions:**  
- **CNS:** Headache dizziness  
- **CV:** Hypertension, arrhythmias, myocardial infarction (MI/heart attack)  
- **EENT:** Blepharoptosis, conjunctivitis, keratitis, eye dryness, double vision, tearing, increased sensitivity to light, sinusitis, pharyngitis  
- **GI:** Nausea, dyspepsia, difficulty swallowing  
- **Respiratory:** Pneumonia, bronchitis, upper respiratory tract infection  
- **Skin:** Skin tightness, ecchymosis  
- **Other:** Tooth disorder, injection site redness, edema, or pain; flulike symptoms; facial muscle paralysis, infection, anaphylaxis

**Dosages:** Usual dosage is 236 units injected IM locally into affected muscles. Dosage ranges from 198 units to 300 units to relax skeletal muscles and reduce severity of abnormal head position and neck pain associated with cervical dystonia. Each indication varies in dosages, and also varies in onset, peak, and durations.

**Nursing Considerations:** Some doctors use Artane (antiparkinson) for drooling, but it is a systemic drug, where as Botox is a local injection.  
- Clinical effects are typically seen within a week of injection; effects of Botox typically last between 3 - 6 months.  
- The safety, effectiveness, specificity and reversibility of Botox therapy makes it an extremely useful therapy.  
- Botox is useful in decreasing pain in the small intestine, with an accumulated effect with several treatments, also for drooling, injections are made in the submandibular and other
glands also used for pain in intestines and to help spasms in legs.
-Contraindicated in patients hypersensitive to drug.
-Also contraindicated in those who have an active infection at the injection site.
-Use cautiously in those with cardiovascular disease, peripheral neuropathy, neuromuscular disorders, or inflammation at the injection site.
-There is an increased risk of adverse effects with the followed groups of drugs: Aminoglycosides, Anticholinesterase compounds, Clindamycin and Lincomycin (antibiotics), Magnesium Sulfate (mineral), and other neuromuscular blockers.
-Stay alert for signs and symptoms of anaphylaxis, particularly after the first dose.
-Monitor vital signs and EKG, watching for evidence of hypertension, Arrhythmias, and myocardial infarction (MI/heart attack).
-Assess effect of drug on affected muscles; check for paralysis.
-Monitor temperature. Watch for signs and symptoms of respiratory and EENT (ear, eyes, nose, and throat) infections as well as flulike symptoms.
-Teach patient about desired effect of injection. Advise patient to report paralysis.
-Instruct patient to report signs and symptoms of infection, particularly flulike illness and EENT (ear, eye, nose, and throat) and respiratory infections.
-Inform patient being treated for blepharospasm (uncontrollable blinking) that he may experience transient eyelid drooping, corneal inflammation, double vision, dry eyes, tearing, and light sensitivity.
-As appropriate, review all other significant and life threatening adverse reactions and interactions, especially those related to the drugs mentioned above.
LEVSIN/HYPOSACYAMINE SULFATE
(Antispasm, Antiulcer)

Indications: GI (gastrointestinal) tract disorders caused by spasm; as adjunctive therapy for peptic ulcers, cystitis, renal colic; as drying agent to relieve symptoms of allergic rhinitis, parkinsonism; to diminish secretions and block cardiac vagal reflexes preoperatively; diagnostic procedures; to block adverse muscarinic effects of anticholinesterase agents; organophosphate pesticide toxicity

Actions: Inhibits GI (gastrointestinal) propulsive mobility and decreases gastric acid secretion, controls excessive pharyngeal, tracheal and bronchial secretions

Adverse Reactions: CNS: Confusion or excitement in elderly patients, fever, headache, insomnia, drowsiness, dizziness, nervousness, weakness
CV: Palpitations, tachycardia
EENT: Blurred vision, mydriasis, increased intraocular pressure, cycloplegia, photophobia
GI: Constipation, dry mouth, paralytic ileus, dysphagia, heartburn, loss of taste, nausea, vomiting
GU: Urinary hesitancy and retention
Skin: Urticaria, decreased or lack of sweating
Other: Hypersensitivity reactions fever (especially in children)

Dosages: 0.125 mg to 0.25 mg oral or sublingual three or four times a day before meals and at bedtime. Or 0.375 mg to 0.75 mg extended release form orally every 12 hours. Or 0.25 mg to 0.5 mg IV, IM or subcutaneously every four hours two to four times a day. Substitute oral drugs when symptoms are controlled. Maximum 1.5 mg daily. For children over 12 and adults. For children ages 2 to 12 individualize dosage according to weight. Do not exceed 0.75 mg in 24 hours. Children younger than 2 individualize dosage according to weight. Maximum dose is based on weight. Each indication dosage may vary. The oral route will have an onset of 20 - 30 minute with a peak of 30 to 60 minutes and a duration of 4 - 12 hours; the oral route (extended) will have an onset of 20 -
30 minutes with a peak of 40 - 90 minutes with a duration of 12 hours; the IV onset is 2 - 3 minutes with a peak of 15 - 30 minutes and a duration of 4 hours; the IM has a peak of 15 - 30 minutes and a duration of 4 - 12 hours and the sublingual route has an onset of 5 - 20 minutes with a peak of 30 - 60 minutes with a duration of 4 hours.

Nursing Considerations: Amantadine (Symmetrel - antiviral), Antihistamines, Antiparkinsonians, Disopyramide (Norpace - antiarrhythmic), Glutethimide (hypnotic/sedative), MAO (Monoamine Oxidase) Inhibitors, Meperidine (Demerol - pain), Phenothiazines, Procainamide (Procan - heart), Quinidine - heart, Tricyclic Antidepressants may have additive adverse effects. Avoid using together.

-Antacids may decrease absorption of oral cholinergics. Separate doses by 2 or 3 hours. Ketoconazole (Nizoral - antifungal) may interfere with Nizoral (antifungal) absorption. Separate doses by 2 or 3 hours.

-Contraindicated in patients hypersensitive to Anticholinergics and in those with glaucoma, obstructive uropathy, obstructive disease of the GI (gastrointestinal) tract, severe Ulcerative Colitis, Myasthenia Gravis, Paralytic Ileus, intestinal atony, unstable CV (cardiovascular) status in acute hemorrhage, tachycardia secondary to Cardiac Insufficiency of Thyrotoxicosis, or Toxic Megacolon.

-Use cautiously in patients with Autonomic Neuropathy, Hyperthyroidism, Coronary Artery Disease, Arrhythmias, Heart Failure, Hypertension, Hiatal Hernia with reflux esophagitis, Hepatic or Renal Disease, known or suspected GI (gastrointestinal) infection, and Ulcerative Colitis.

-Use cautiously in patients in hot or humid environments; drug can cause heat stroke.

-Use cautiously in children and the elderly because they may be more susceptible to adverse effects.

-Give drug 30 minutes to 1 hour before meals and at bedtime. Bedtime dose can be larger; give at least 2 hours after last meal of the day.

-Overdose may cause curarelike effects, such as respiratory paralysis. Keep emergency equipment available. Drug is
dialyzable.

- Monitor patient's vital signs and urine output carefully.
- Injection contains Sodium Metabisulfite (used as a sterilizer and a antioxidant), which may cause allergic reaction in certain people.
- Do not confuse Anaspaz (Levsin - antispasm) with Anaprox (Naprosyn - arthritic pain) or Antispas (Bentyl - irritable bowel syndrome - spasms).
- Urge patient to take drug as prescribed.
- Caution patient to avoid driving and other hazardous activities if drowsiness, dizziness or blurred vision occurs, to drink plenty of fluids to help prevent constipation, and to report rash or other skin eruptions.
- Advise patient not to take any new drug or OTC (over the counter) preparation unless directed by Physician.
ROBINUL/GLYCOCYRROLATE
( Antidrooling)

Indication: To block adverse cholinergic effects caused by
Anticholinesterases used to reverse neuromuscular blockade;
preoperatively to diminish secretions and block cardiac vagal
reflexes, intraoperatively to diminish secretions and block
cardiac vagal reflexes, adjunctive therapy in peptic ulcerations
and other GI (gastrointestinal) disorders

Action: Inhibits cholinergic (muscarinic) actions of acetylcholine on
autonomic effectors innervated by postganglionic cholinergic
nerves. Diminishes the volume and free acidity of gastric
secretion and controls excessive pharyngeal, tracheal, and
bronchial secretions. Blocks cardiac vagal inhibitory reflexes.

Adverse Reactions: CNS: Fever, weakness, nervousness, insomnia, drowsiness,
dizziness, headache, confusion, excitement
Cardiovascular: Palpitations, tachycardia
EENT: Dilated pupils, blurred vision, photophobia, increased
intra-ocular pressure
GI: Constipation, dry mouth, nausea, loss of taste, abdominal
distention, vomiting, epigastric distress
GU: Urinary hesitancy, urine retention
Skin: Urticaria, decreased sweating or anhidrosis
Other: Anaphylaxis, allergic reactions, suppressed lactation

Dosages: 1 - 2 mg oral three times per day (0.1 mg or 0.2 mg three or four
times a day if IM or IV route). Dosage must be individualized.
Maximum oral dose is 8 mg daily, maximum four doses IM or IV.
Available forms are: injection 0.2 mg/ml in 1 ml, 2 ml, 5 ml, and
20 ml vials; tablets 1 mg and 2 mg. The oral route has a duration
of 8 - 12 hours. The IV route has an onset of 1 minute and a
duration of 2 - 7 hours, and the IM route has an onset of 15 -
30 minutes with a peak of 30 - 45 minutes and a duration of 2 -
7 hours.

Nursing Considerations: If IV form, do not give with Valium
(anticonvulsant/antianxiety), Sodium Bicarbonate (buffer in acid
-base system, or Sodium Chloride (an electrolyte) - these drugs
are not compatible.
- Amantadine (Symmetrel - antiviral), Antihistamines,
Antiparkinsonians, Disopyramide (Norpace - heart), Glutethimide (hypnotic/sedative), Meperidine (Demerol - pain), Phenothiazines, Procainimide (Procan - heart), Quinidine (heart), Tricyclic Antidepressants may have additive adverse effects. Avoid using together.

- Contraindicated in patients hypersensitive to drug, in neonates, and in those with Glaucoma, Obstructive Uropathy, obstructive disease of the GI (gastrointestinal) tract, Myasthenia Gravis, Paralytic Ileus, Intestinal Atony, unstable CV (cardiovascular) status in Acute Hemorrhage, Tachycardia Secondary to Cardiac Insufficiency or Thyrotoxicosis, severe Ucerative Colitis, Toxic Megacolon or known or suspected GI (gastrointestinal) infection.

- Use cautiously in patients with Autonomic Neuropathy, Hyperthyroidism, Coronary Artery Disease - CAD, Arrhythmias, Heart Failure, Hypertension, Hiatal Hernia, Hepatic or Renal Disease, Ulcerative Colitis, and known or suspected GI (gastrointestinal) infection.

- Use cautiously in patients in hot or humid environments; drug can cause heat stroke.

- Not recommended for peptic ulcers in children younger than age 12.

- Give oral form 30 to 60 minutes before meals.
- Injection contains Benzyl alcohol; do not use in neonates younger than 1 month of age.

- Check all dosages carefully; slight overdose can lead to toxicity.

- Overdose may cause curarelike effects, such as respiratory paralysis. Keep emergency equipment available.

- Monitor vital signs carefully. Watch closely for adverse reactions, especially in geriatric and debilitated patients. Call Physician promptly if reactions occur.

- Elderly patients may be more susceptible to adverse effects and typically receive smaller doses.

- Monitor patient for diarrhea; it may be a sign of incomplete intestinal obstruction.

- Tell patient to take oral drug 30 to 60 minutes before meals.

- Tell patient not to crush or chew extended release products.
- Warn patient to avoid activities that require alertness until drug’s CNS (central nervous system) effects are known.
- Advise patient to report signs and symptoms of urinary hesitancy or retention.
TRANSDERM-SCOP-SCOPOLAMINE HYOSCINE  
(Anticholinergics)

Indication: Spastic states, delirium, preanesthetic sedation, and to prevent nausea and vomiting from motion sickness

Action: Inhibits muscarinic actions of acetylcholine on autonomic effectors innervated by postganglionic cholinergic neurons. May affect neural pathways originating in the inner ear to inhibit nausea and vomiting.

Adverse Reactions: CNS: Disorientation, restlessness, irritability, dizziness, drowsiness, headache, confusion, hallucinations, delirium, impaired memory
CV: Paradoxical bradycardia, palpitations, tachycardia, flushing
EENT: Dilated pupils, blurred vision, photophobia, increased intraocular pressure, difficulty swallowing
GI: Constipation, dry mouth, epigastric distress, nausea, vomiting
GU: Urinary hesitancy, urine retention
Respiratory: Bronchial plugging, depressed respirations
Skins: Rash, dryness, contact dermatitis with transdermal patch
Other: Heat intolerance

Dosages: For spastic states 0.4 - 0.8 mg orally; for delirium given IM or IV, or subcutaneous, adults 0.3 - 0.65 mg- dilute solution with sterile water for injection before giving IV: Children - 0.006 mg/kg IV, IM, or subcutaneously. Maximum dose 0.3 mg. Dilute solution with sterile water for injection before giving IV. For nausea and vomiting dosages may change. Available forms are tablets: in 0.4 mg; and in transdermal patch: 1.5 mg/2.5 cm2 (1 mg/72 hours).

Nursing Considerations: Amantadine (Symmetrel - antiparkinsonian), Antihistamines, Antiparkinsons, Disopyramide (antiarrhythmic), Glutethimide (enzyme inducer and has been used as an antidepressant), Meperidine (Demerol - pain), Phenothiazines, Procainamide (Procan), Quinidine (both are heart medications), Tricyclic Antidepressants may increase risk of adverse CNS
(central nervous system) reactions. Avoid using together.
-Antacids may decrease oral absorption of Anticholinergics. Separate doses by 2 or 3 hours.
-Atenolol (Tenormin - antihypertensive) may increase pharmacologic effects of Atenolol (Tenormin - antihypertensive). Monitor patient for adverse effects.
-CNS (central nervous system) Depressants may increase risk of CNS (central nervous system) depression. Monitor patient closely.
-Digoxin (heart) may increase Digoxin (heart) level. Monitor patient for Digoxin (heart) toxicity.
-Ketoconazole (Nizoral -antifungal) may interfere with Ketoconazole (Nizoral - antifungal) absorption. Separate doses by 2 or 3 hours.
-Jaborandi tree may decrease drug effects. Discourage use together.
-Pill bearing spurge may decrease drug effects. Inform patient of this interaction.
-Squaw vine may decrease metabolic breakdown. Discourage use together.
-Alcohol use may increase risk of CNS (central nervous system) depression. Discourage use together.
-Contraindicated in patients with Angle Closure Glaucoma, Obstructive Uropathy, obstructive disease of the GI (gastrointestinal) tract, Asthma, Chronic Pulmonary Disease, Myasthenia Gravis, Paralytic Ileus, Intestinal Atony, unstable CV (cardiovascular) status in Acute Hemorrhage, Tachycardia from Cardiac Insufficiency, or Toxic Megacolon.
-Contraindicated in patients hypersensitive to Belladonna or Barbiturates.
-Use cautiously in patients with autonomic neuropathy, Hyperthyroidism, Coronary Artery Disease, Arrhythmias, Heart Failure, Hypertension, Hiatal Hernia with reflux esophagitis, Hepatic or Renal Disease, known or suspected GI gastrointestinal) infection, or Ulcerative Colitis.
-Use cautiously in children.
-Use cautiously in patients in hot or humid environments; drug can cause heatstroke.
- Raise side rails as a precaution because some patients become temporarily excited or disoriented and some develop amnesia or become drowsy. Reorient patient, as needed.
- Tolerance may develop when therapy is prolonged.
- Atropine-like toxicity may cause dose-related adverse reactions. Individual tolerance varies greatly.
- Overdose may cause curare-like effects such as respiratory paralysis. Keep emergency equipment available.
- Advise patient to apply patch the night before a planned trip. Transdermal method releases a controlled therapeutic amount of drug. Transderm Scop is effective if applied 2 or 3 hours before experiencing motion but is more effective if applied 12 hours before.
- Instruct patient to remove one patch before applying another.
- Instruct patient to wash and dry hands thoroughly before and after applying the transdermal patch (on dry skin behind the ear) and before touching the eye because pupil may dilate. Tell patient to discard patch after removing it and to wash application site thoroughly.
- Tell patient that if patch becomes displaced, he should remove it and apply another patch on a fresh skin site behind the ear.
- Alert patient to possible withdrawal signs or symptoms (nausea, vomiting, headache, dizziness) when transdermal system is used for longer than 72 hours.
- Advise patient that eyes may be more sensitive to light while wearing patch. Advise patient to wear sunglasses for comfort.
- Warn patient to avoid activities that require alertness until CNS (central nervous system) effects of drug are known.
- Instruct patient to ask Pharmacist for brochure that comes with the transdermal product.
- Urge patient to report urinary hesitancy or urine retention.
DIGESTANTS

Digestants promote digestion in the gastrointestinal tract. Used in patients lacking such digestive substances as bile salts, gastric acid, or pancreatic enzymes, they can provide replacement therapy in specific deficiencies. The most widely used digestants are bile salts, hydrochloric acid, and pancreatic enzymes.

Major Uses
Bile salts are used to treat uncomplicated constipation and to help maintain normal cholesterol solubility in the bile. Dehydrochloric and ketochloric acids (synthetic bile salts) increase the solubility of cholesterol, preventing its buildup in recurring biliary calculi or strictures, recurring noncalculous cholangitis, biliary dyskinesia, and chronic partial obstruction of the common bile duct, prolonged drainage from biliary fistulas or drainage of infected bile duct through a T tube, and sclerosing cholangitis. They may also prevent bacterial accumulation after biliary tract surgery. Glutamic acid hydrochloride and dilute hydrochloric acid (gastric acidifiers) are used to treat hypochlorhydria and achlorhydria. Pancreatin and pancrelipase (enzymes) supplement or replace exocrine pancreatic secretions, which are lacking in such disorders as cystic fibrosis.

Mechanism of Action
Bile salts, dehydrocholic acid, and ketochoanaline acid stimulate bile flow from the liver, promoting normal digestion and absorption of fats, fat soluble vitamins, and cholesterol. Glutamic and hydrochloric acids replace gastric acid. Pancreatin and pancrelipase replace endogenous exocrine pancreatic enzymes and aid intestinal digestion of starches, fats, and proteins.

Absorption, Distribution, Metabolism and Excretion
About 80% to 90% of bile salts are reabsorbed primarily in the ileum. They return to the liver and reenter the bile acid pool. As natural body substances, the rest of these digestants assume the normal physiology of the body.

Onset and Duration
Onset and duration of digestants are unknown.
MEGACE/MEGESTROL
(Increase appetite)

Indication: Appetite stimulation, anorexia, cachexia, or unexplained significant weight loss in patients with cancer or AIDS

Action: Appetite stimulating mechanism is unknown. A progestin that inhibits hormone dependent tumor growth by inhibiting pituitary and adrenal steroidogenesis.

Adverse Reactions: Cardiovascular: Thrombophlebitis, heart failure, hypertension, thromboembolism
GI: Nausea, vomiting, diarrhea, flatulence, constipation, dry mouth, increased appetite
GU: Breakthrough menstrual bleeding, impotence, vaginal bleeding or discharge, UTI (urinary tract infection)
Metabolic: Hyperglycemia, weight gain
Musculoskeletal: Carpel tunnel syndrome
Respiratory: Pulmonary embolism, dyspnea
Skin: Alopecia, rash
Other: Gynecomastia, tumor flare

Dosages: 800 mg/day orally (20 ml regular oral suspension) or 625 mg orally (5ml concentrated oral suspension) once daily. Available forms: oral suspension 40 mg/ml; oral suspension (concentrated) 125 mg/ml; tablets 20 mg and 40 mg. The peak time is 1-5 hours.

Nursing Considerations: May increase glucose level.
- Contraindicated in patients hypersensitive to drug.
- Contraindicated as a diagnostic test during pregnancy.
- Use cautiously in patients with history of thrombophlebitis or thromboembolism.
- May increase glucose level in diabetic patients.
- Drug is relatively nontoxic with a low risk of adverse effects.
- Two months is an adequate trial period in patients with cancer.
- Inform patient that therapeutic response is not immediate.
- Tell patient that the ES (extra strength) oral suspension is more concentrated than the oral regular suspension so a smaller amount is needed.
PRILOSEC/OMEPRAZOLE
(Gastroesophageal Reflux Disease - GERD)

Indication: Symptomatic gastroesophageal reflux disease (GERD) without esophageal lesions, erosive esophagitis and accompanying symptoms caused by gastroesophageal reflux disease (GERD), maintenance of healing erosive esophagitis, pathologic hypersecretory conditions (such as Zollinger Ellison syndrome), duodenal ulcer (short term treatment), Helicobacter pylori infection and duodenal ulcer disease, to eradicate H. pylori with Clarithromycin (dual therapy), H. pylori infection and duodenal ulcer disease, to eradicate H. pylori with Clarithromycin and Amoxicillin (triple therapy), short term treatment of active benign gastric ulcer, frequent heartburn (2 or more days a week).

Action: Inhibits the activity of the acid (proton) pump and binds to Hydrogen potassium adenosine triphosphatase at secretory surface of gastric parietal cells to block formation of gastric acid

Adverse Reactions: CNS: Asthenia, headache, dizziness
Respiratory: Coughing, upper respiratory infection
GI: diarrhea, abdominal pain, nausea, vomiting, constipation, flatulence
Musculoskeletal: Back pain
Skin: Rash

Dosages: 20 mg daily initially. Dose may be adjusted depending on need. Doses have been given up to 120 mg in three divided doses per day. Continue therapy as long as clinically indicated. Available forms: capsules (delayed release) 10 mg, 20 mg and 40 mg; powder for oral suspension 20 mg/packet, and 40 mg/packet; tablets (delayed release 20 mg. The onset of drug is 1 hour, the peak is 30 minutes to 2 hours and the duration is less than 3 days.

Nursing Considerations: Ampicillin esters, iron derivatives, Ketoconazole (Nizoral - antifungal) may cause poor bioavailability of these drugs because they need a low gastric pH for optimal absorption. Avoid using together.
-Diazepam (Valium - anticonvulsant/antianxiety), Fosphenytoin
(Cerebyx – anticonvulsant), Phenytoin (Dilantin - anticonvulsant), Warfarin (Coumadin – blood thinner), may decrease hepatic clearance, possibly leading to increased levels of these drugs. Monitor drugs levels.

- Ginkgo Biloba may decrease therapeutic effects of drug. Discourage use together.
- Male fern may inactivate herb. Discourage use together.
- Pennyroyal may change rate at which herb’s toxic metabolites form. Ask patient about the use of herb, and discourage use together.
- St. John’s Wort (herb) may increase risk of sun sensitivity. Advise patient to avoid excessive sunlight exposure.
- Contraindicated in patients hypersensitive to drug and its components.
- Zegerid (another name for Prilosec – antiulcer) is contraindicated in patients with metabolic alkalosis and hypocalcemia.
- Use cautiously in patients with Bartter Syndrome, hypokalemia, and respiratory alkalosis.
- Long term administration of sodium bicarbonate (alkalinizer - buffer in the acid-base system) with calcium or milk can cause milk alkali syndrome.
- Dosage adjustment may be necessary in Asians and patients with hepatic impairment.
- Drug increases its own bioavailability with repeated doses. Drug is unstable in gastric acid; less drug is lost to hydrolysis because drug increases gastric pH.
- Zegerid (Prilosec – antiulcer) contains 460 mg sodium per dose in the form of sodium bicarbonate (alkalinizer - buffer in the acid-base system).
- Do not confuse Prilosec (antiulcer) with Prozac (antidepressant), Prilocaine (Citanest - local anesthetic often used in dentistry) or Prinivil (antihypertensive).
- Gastrin level rises in most patients during the first two weeks of therapy.
- Tell patient to swallow tablets or capsules whole and not to open, crush, or chew them.
- Warn patients that Zegerid (Prilosec – antiulcer) contains 460
mg of Sodium Bicarbonate (buffer in acid base system) per dose. Those following a sodium restricted diet should be cautious.

- Tell patients to empty contents of Zegerid (Prilosec - antiulcer) packet into a small cup containing 2 tablespoons of water. Instruct him not to use other liquids or foods. Stir contents and drink immediately. Refill cup with water and drink.
- Instruct patient to take drug 30 minutes before meals. Zegerid (Prilosec - antiulcer) powder for oral suspension should be taken on an empty stomach at least 1 hour before a meal.
- Caution patient to avoid hazardous activities if he gets dizzy.
- Advise patient that Prilosec (antiulcer) OTC (over the counter) is not intended to treat infrequent (one episode of heartburn a week or less), or for those who want immediate relief of heartburn.
- Inform patient that Prilosec OTC (over the counter) may take 1 to 4 days for full effect, although some patients may get complete relief of symptoms with 24 hours.
**ZANTAC/RANITIDINE**  
(Antiulcer)

**Indication:** Active duodenal and gastric ulcer, maintenance therapy for duodenal and gastric and gastric ulcer, pathologic hypersecretory conditions, such as Zollinger Ellison syndrome (ZES), Gastroesophageal reflux disease (GERD), erosive esophagitis, heartburn

**Action:** Competitively inhibits the action of histamine on the H2 at receptor sites of the parietal cells decreasing gastric acid secretions

**Adverse Reactions:**  
CNS: Headache, malaise, vertigo  
EENT: Blurred vision  
Hepatic: Jaundice  
Other: Anaphylaxis, angioedema, burning and itching at injection sites

**Dosages:**  
150 mg orally twice a day or 300mg/day once a day at bedtime.  
Or 50 mg IV or IM every 6 hours to 8 hours. Maximum daily IV dose is 400 mg. Or 150 mg by continuous infusion at 6.25 mg/hour over 24 hours. For children ages 1 month to 16 years for duodenal and gastric ulcers only, 2 mg to 4 mg/kg orally twice a day, up to 300 mg/day. Each indication will vary in dosages.  
Available forms are: granules (effervescent) 150 mg; infusion 1 mg/ml in 50 ml containers; injection 25 mg/ml; syrup 15 mg/ml; tablets 75 mg, 150 mg, and 300 mg; tablets (dispersible) 150 mg; tablets 25 mg and 150 mg. The oral route has a 1 hour onset with a peak of 1 – 3 hours and a duration of 13 hours.

**Nursing Considerations:** To prepare IV injection, dilute 2 ml (50 mg) Zantac (antiulcer) with compatible IV solution to a total volume of 20 ml, and inject over at least 5 minutes. Compatible solutions include sterile water for injection, normal saline solution for injection, D5W, or lactated ringers injection.  
-To give drug by intermittent IV infusion, dilute 50 mg (2 ml) in 100 ml compatible solution and infuse at a rate of 5 to 7 ml/minute. The premixed solution is 50 ml and does not need further dilution. Infuse over 15 to 20 minutes.  
-For continuous infusion to treat active duodenal or gastric ulcer, dilute 150 mg in 250 ml of D5W. For hypersecretory conditions
such Zollinger Ellison syndrome, dilute with D5W or other compatible solution to no more than 2.5 mg/ml. After dilution, solution is stable for 48 hours at room temperature.
-Store IV injection at 39 degrees to 86 degrees F (4 to 30 degrees C). Store premixed containers at 36 to 77 degrees F (2 to 25 degrees C).
-Antacids may interfere with Zantac (antiulcer) absorption. Stagger doses, if possible.
-Glipizide (Glucotrol - diabetes) may increase hypoglycemic effect. Adjust Glucotrol (diabetes) dosage, as directed.
-Procainamide (Procan - heart) may decrease renal clearance of Procan (heart). Monitor patient closely for toxicity.
-Warfarin (Coumadin - blood thinner) may interfere with Warfarin (Coumadin - blood thinner) clearance. Monitor patient closely.
-May increase creatinine and ALT levels.
-May cause false-positive results in urine protein tests using Multistix.
-Contraindicated in patients hypersensitive to drug and those with acute porphyria.
-Use cautiously in patients with hepatic dysfunction. Adjust dosage in patients with impaired renal function.
-Assess patient for abdominal pain. Not presence of blood in emesis, stool, or gastric aspirate.
-Drug may be added to total parenteral nutrition (TPN) solutions.
-Do not confuse Ranitidine (Zantac - antiulcer) with Rimantadine (Flumadine - antiviral); do not confuse Zantac - antiulcer) with Xanax (antianxiety) or Zyrtec (antihistamine).
-Instruct patient on proper use of OTC (over the counter) preparation, as indicated.
-Remind patient to take once - daily prescription drug at bedtime for best results.
-Instruct patient to take without regard to meals because absorption is not affected by food.
-Tell patient taking 150 mg effervescent dose to dissolve drug in 6 to 8 ounces of water before taking. Tell patient to dissolve 25 mg effervescent dose tablet in at least 5 ml of water and give with a dosing cup, medicine dropper, or oral syringe.
-Urge patient to avoid cigarette smoking because this may increase gastric acid secretion and worsen disease.
-Advise patient to report abdominal pain and blood in stool and emesis.
-Warn patients with phenylketonuria that effervescent dose granules and tablets contain aspartame (artificial sweetener).
ERYTHROMYCIN

(Antibiotic)

Indications: Low dose to increase GI (gastrointestinal) motility
Action: Inhibits bacterial protein synthesis by binding to the 50s subunit of the ribosome
Adverse Reaction: Cardiovascular: Torsades de Pointe, Arrhythmias
EENT: Blurred vision, itching and burning eyes, slowed corneal wound healing
GI: abdominal pain and cramping, nausea, vomiting, diarrhea
Hepatic: Hepatic dysfunction, hepatitis
Skin: Urticaria, rashes, pruritus
Other: Overgrowth of non susceptible bacteria or fungi with long term use, increased appetite, aggravation of weakness in Myasthenia Gravis, allergic reactions, superinfection, phlebitis at IV site

Dosages: Adults - 250 mg to 500 mg per day every 6 hours for 10 to 14 days; children - 30 mg to 50 mg/kg/day orally in four divided doses over 10 to 14 days. (There are other indications for its use and therefore different variations in dosages. It can also be given in the IV route in some instances.) The onset of action for the oral route is 1 hour and the IV route is rapid. The peak for the oral route is 1 - 4 hours and IV the peak is at the end of the infusion. The duration is the same for orally and IV and that is 6 - 12 hours.

Nursing Considerations: Interactions with Carbamazepine (Tegretol - anticonvulsant) - increased blood levels and increased risk of toxicity. Avoid using together.
-Clindamycin, Lincomycin (antibiotics), may be antagonistic. Avoid using together.
-Cyclosporine (Neoral - to prevent organ transplant rejection) may increase Cyclosporine (Neoral - immunosuppressant) level. Monitor drug level.
-Digoxin (heart) may increase Digoxin (heart) level. Monitor patient for Digoxin (heart) toxicity.
-Dihydroergotamine (Migranal for vascular headaches), Ergotamine (Ergomar - also to treat vascular headaches) may cause acute ergot toxicity. Avoid using together.
- Disopyramide (Norpace - heart) may increase Norpace - heart level, which may cause Arrhythmias and prolonged QT intervals. Monitor EKG.

- Midazolam (Versed - sedative/hypnotic), Triazolam (Halcion/sleep) may increase effects of these drugs. Monitor these patients closely.

- Oral Anticoagulants may increase anticoagulant effect. Monitor PT and INR closely.

- Fluroquinolones, other drugs that prolong the QT interval (Amiodarone (heart), Antipsychotics, Procainamide (heart), Quinidine (heart), Sotalol (Betapace - heart), Tricyclic Antidepressants) may have additive effects. Monitor EKG for QT interval prolongation. Avoid using together, if possible.

- Rifamycins (Rifabutin, Rifampin, Rifapentine - all Antimycobacterial) may decrease therapeutic effects if Erythromycin (antibiotic) while increasing adverse effects of Rifamycin (antimycobacterial). Monitor patient.

- Strong CYP3A inhibitors (such as Diltiazem - Cardiazem (heart), Verapamil - Calan (heart), Troleandomycin (Tao - oral corticosteroid) may increase the risk of sudden death from cardiac causes. Do not use together.

- Theophylline (bronchodilator) may decrease Erythromycin (antibiotic) level and increase Theophylline (bronchodilator) toxicity. Use together cautiously.

- Pill-bearing spurge may inhibit CYP3A enzymes, affecting drug metabolism. Urge caution.

- Food, grapefruit juice - food can delay absorption; grapefruit juice may inhibit drug's metabolism. Do not give within 2 hours of a meal; caution patient to avoid grapefruit juice during therapy.

- May increase alkaline phosphatase, ALT, AST, and bilirubin levels.

- May interfere with fluorometric determination of urine catecholamines and with colorimetric assays.

- Contraindicated in those hypersensitive to drug or other Macrolides.

- Erythromycin (antibiotic) estolate is contraindicated in patients with hepatic disease.
- Use Erythromycin (antibiotic) salts cautiously in patients with impaired hepatic function.
- Do not use drug to treat neurosyphilis.
- Obtain urine specimen for culture and sensitivity tests before giving. Begin therapy awaiting results.
- When giving suspension, note the concentration.
- Monitor patient for superinfection. Drug may cause overgrowth of nonsusceptible bacteria or fungi.
- Monitor hepatic function. Erythromycin (antibiotic) estolate may cause serious hepatotoxicity in adults. Other salts cause less serious hepatotoxicity.
- Ototoxicity may occur, especially in patients with renal or hepatic insufficiency and in those receiving high doses of drug.
- Coated tablets or encapsulated pellets cause less GI (gastrointestinal) upset, so they may be better tolerated by patients who have trouble tolerating drug.
- Tell patient to take drug as prescribed, even after he feels better.
- Instruct patient to take oral form of drug with full glass of water within 2 hours of meals for best absorption.
- Drug may be taken with food if GI (gastrointestinal) upset occurs. Tell patient not to take drug with fruit juice or to swallow the chewable tablets whole.
- Instruct patient to report adverse reactions, especially nausea, abdominal pain, vomiting, and fever.
REGLAN/METOCLOPRAMIDE
(Reflex)

Indications: To prevent or reduce nausea and vomiting from emetogenic cancer chemotherapy; to prevent or reduce postoperative nausea and vomiting; to facilitate small bowel intubation; to aid in radiologic examinations; delayed gastric emptying secondary; gastroesophageal reflux disease (GERD)

Action: Stimulates motility of the upper GI (gastrointestinal) tract by increasing lower esophageal sphincter tone and blocks Dopamine receptors at the chemo receptor trigger zone, gastric emptying time and GI (gastrointestinal) transit time are shortened, no effect on gastric, biliary or pancreatic secretions

Adverse Reactions: CNS: Anxiety, drowsiness, acute dystonic reactions, fatigue, lassitude, restlessness, neuroleptic malignant syndrome, seizures, suicide ideation, akathisia, confusion, depression, dizziness, extrapyramidal symptoms, hallucinations, headache, insomnia, tardive dyskinesia
Cardiovascular: Supra ventricular tachycardia, bradycardia, hypotension, transient hypertension
GI: Nausea, bowel disturbances, diarrhea
GU: Incontinence, urinary frequency
Skin: Rash, urticaria
Other: Fever, prolactin secretion

Dosages: 10 mg - 15 mg for adults x4/day before meals and at bedtime. Available forms: injection 5 mg/ml; syrup 5 mg/ml; tablets 5 mg and 10 mg. The oral route has an onset of 30 - 60 minutes with a peak of 1 - 2 hours and a duration of 1 - 2 hours; the IV route has an onset of 1 - 3 minutes with a duration of 1 - 2 hours and the IM route has an onset of 10 - 15 minutes with a duration of 1 - 2 hours.

Nursing Considerations: Anticholinergics, Opioid Analgesics may antagonize GI (gastrointestinal) motility effects of Reglan (reflux). Use together cautiously.
-CNS (central nervous system) Depressants may cause additive CNS (central nervous system) effects. Avoid using together.
-Levodopa (antiparkinson) and Reglan (reflux) have opposite
effects on Dopamine receptors. Avoid using together.
-MAO (Monoamine Oxidase) Inhibitors may increase release of catecholamines in patients with hypertension. Use together cautiously.
-Phenothiazines may increase risk of extrapyramidal effects. Monitor patient closely.
-Alcohol use may cause additive CNS (central nervous system) effects. Discourage use together.
-May increase liver function tests, aldosterone and prolactin levels.
-May decrease neutrophil and granulocyte counts.
-Contraindicated in patients hypersensitive to drug and in those with pheochromocytoma or seizure disorders.
-Contraindicated in patients for whom stimulation of GI (gastrointestinal) motility might be dangerous (those with hemorrhage, obstruction, or perforation).
-Monitor bowel sounds.
-Safety and effectiveness of drug have not been established for therapy lasting longer than 12 weeks.
-Use 25 mg Benadryl IV to counteract extrapyramidal adverse effects from high doses.
-Tell patient to avoid activities that require alertness for 2 hours after doses.
-Urge patient to report persistent or serious adverse reactions promptly.
-Advise patient not to drink alcohol during therapy.


**XENICAL/ORLISTAT**  
(antireflux)

**Indication:** Used occasionally for children with Batten Disease who have problems with vomiting and/or reflux problems

**Action:** Attaches to the lipases and blocks them from breaking down some of the fat you have eaten therefore increasing GI (gastrointestinal) motility and decreasing vomiting and/or reflux problems, binds to gastric and pancreatic lipase to prevent the digestion of fats when taken with foods containing fats, the fats pass through the intestines unchanged and is not absorbed

**Adverse Reactions:**  
- CNS - headache, dizziness, anxiety, depression, fatigue, sleep disorder  
- Cardiovascular: Pedal edema  
- Respiratory: Flu, upper respiratory infection, lower respiratory infection  
- GI: Changes in bowel patterns, oily spotting, gas with discharge, urgent need to go to the bathroom, oily or fatty stools, increased number of stools/day, an oily discharge, inability to control bowel movements, due to the presence of undigested fat the oil seen in a bowel movement may be clear or have the coloration such as brown or orange, rectal pain, vomiting, nausea  
- GU: Urinary tract infection (UTI), menstrual irregularities, vaginitis  
- Musculoskeletal: Back pain, leg pain, arthritis, myalgia, joint disorder, tendinitis  
- Skin: rash, dry skin  
- Other: Tooth and gingival disorders  

**Dosages:** One capsule of 120mg with each meal that contains fat up to one hour after the meal

**Nursing Considerations:**  
Cyclosporine (immunosuppressant in organ transplants) may decrease Cyclosporine (immunosuppressant) levels, risking organ rejection. Avoid use together.  
-Fat soluble vitamins (such as Vitamins A and E and betacarotene) may decrease absorption of vitamins. Separate doses by 2 hours.  
-Warfarin (Coumadin - blood thinner) may change coagulation
values. Monitor INR.
-Pravastatin (Pravachol – antilipemic) may slightly increase levels and lipid lowering effects of drug. Monitor patient.
-Contraindicated in patients hypersensitive to drug or its components and in those with chronic malabsorption syndrome or cholestasis.
-Use cautiously in patients with history of hyperoxaluria or calcium oxalate nephrolithiasis or those at risk for anorexia nervosa or bulimia.
-Use cautiously in patients receiving Cyclosporine (immunosuppressant) therapy because of potential changes in Cyclosporine (immunosuppressant) absorption related to variations in dietary intake.
-Exclude organic causes of obesity, such as hypothyroidism, before starting drug therapy.
-Drug is recommended for use in patients with an initial basal metabolic index (BMI) of 30 or more or those with a BMI of 27 or more and other risk factors (such as hypertension, diabetes, or dyslipidemia).
-In diabetic patients. Dosage of oral antidiabetic or insulin may need to be reduced because improved metabolic control may accompany weight loss.
-As with other weight loss drugs, potential for misuse exists in certain patients (such as those with anorexia nervosa or bulimia).
-Do not confuse Xenical (antireflux) with Xeloda (antimetabolite).
-Advise patient to follow a nutritionally balanced, reduced calorie diet that derives only 30% of its calories from fat. Tell him to distribute daily intake of fat, carbohydrate, and protein over three main meals. If a meal is occasionally missed or contains no fat, tell patient that dose of drug can be omitted.
-Advise patient to adhere to dietary guidelines, GI (gastrointestinal) effects may increase when patient takes drug with high fat foods, specifically when more than 30% of total daily calories come from fat.
-Drug reduces absorption of some fat soluble vitamins and beta carotene.
-Tell patient with diabetes that weight loss may improve his
glycemic control, so dosage of his oral antidiabetic (such as Sulfonylurea - antidiabetic or Metformin - Glucophage - antidiabetic) or insulin may need to be reduced during drug therapy.
FISH OILS - THE ESSENTIAL NUTRIENTS

There are good fats and there are bad fats. Artificially produced trans fatty acids are bad in any amount and saturated fats from animal products should be kept to a minimum. The best fats or oils rather, since they are liquid at room temperature, are those that contain the essential fatty acids, so named because without them we would die. Essential fatty acids are polysaturated and grouped into two families, Omega 6 and Omega 3.

Seemingly, minor differences in their molecular structure make the two families act very differently in the body. While the metabolic products of Omega 6 promote inflammation, blood clotting, and tumor growth, the Omega 3 acids act entirely opposite. Although, we do need both Omega 3 and Omega 6, it is becoming increasingly clear that an excess of Omega 6 fatty acids can have dire consequences. Many scientists believe that a major reason for the high incidence of Heart Disease, Hypertension, Diabetes, Obesity, premature aging, and some forms of cancer is the profound imbalance between our intake of Omega 6 and Omega 3 fatty acids.

The main sources of Omega 6 fatty acids are vegetable oils such as corn oil and soy oil, which contain a high proportion of linoleic acid. Omega 3 acids are found in flaxseed oil, walnut oil, and fatty fish. The main component of flaxseed and walnut oils is alpha linolenic acid while the predominant fatty acids found in fatty fish and fish oils are eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA). The most beneficial and active of these fatty acids are EPA and DHA and they play a crucial role in the prevention of Atherosclerosis, Heart Attack, Depression, and Cancer, as well as, Rheumatoid Arthritis, Diabetes, Ulcerative Colitis, and Raynaud’s disease. The US Institute of Health recommends a total daily intake of 650 mg of EPA and DHA, 2.22 grams/day of Omega 3 and 4.44 grams/day of Omega 6.

The human brain is one of the largest “consumers” of DHA. A normal adult human brain contains more than 20 grams of DHA. Low DHA levels have been linked to low brain Serotonin levels, which again are connected to the increased tendency to depression, suicide, and violence. A high intake of fish has been linked to a significant decrease in age related memory loss and cognitive function impairment and a lower risk of developing Alzheimer’s disease.
Several studies have established a clear association between low levels of Omega 3 fatty acids and depression. Countries with a high level of fish consumption have fewer cases of depression. Researchers have used fish oil supplements to treat bipolar disease (manic-depressive illness) and schizophrenia.

Studies have shown that children who regularly eat fresh, oily fish have a four times lower risk of developing asthma than do children who rarely eat such fish by reducing airway inflammation and responsiveness. Fish oils help maintain the elasticity of artery walls, prevent blood clotting, reduce blood pressure and stabilize heart rhythm. Fish oil supplementation may help prevent arrhythmias and sudden cardiac death in healthy men. Heart attack survivors taking supplemental fish oil markedly reduce their risk of another heart attack, a stroke, or death.

It is estimated that 85% or more of people in the Western world are deficient in Omega 3 fatty acids and most get far too much of the Omega 6 fatty acids. Vegetarian diets, for example, tend to be very high in Omega 6.

The processing and packaging of the fish oil are crucial in determining its quality. Low quality oils may be quite unstable and contain significant amounts of mercury, pesticides, and undesirable oxidation products. High quality oils are stabilized with adequate amounts of Vitamin E and are packaged in individualized foil pouches to seal out all light and oxygen. Oils are also much better absorbed than the gelatin capsules.

Cod liver oils and fish oils are not the same. Cod liver oil is extracted from cod liver and is an excellent source of Vitamin A and D. Fish oils are extracted from the tissues (flesh) of fatty fish like salmon and herring and are good sources of EPA and DHA. Fish oils contain very little Vitamin A and D, but cod liver oil does contain EPA and DHA. Fish oil supplementation does, however, lower blood concentrations of Vitamin E, so it is a good idea to take extra Vitamin E when adding fish oils to your diet.

Fish oils also help prevent and protect against macular degeneration (MD, which is an age related cause of blindness for which treatment is limited). A high intake of Omega 6 can increase the risk of MD. Fish oils speed up healing of ligament injuries by daily supplementation of fish oil which could be used to improve the healing of the ligaments by enhancing the entry of new cells into the wound area and by speeding up collagen synthesis. Atopic diseases (which are a form of
allergy) where the hypersensitivity reaction occurs at a location different from the initial contact point between the body and the offending agent, and it also can alleviate Raynaud’s disease (which is characterized by periods of disrupted blood flow to the fingers and sometimes toes, caused by exposure to cold and stress.
HORMONES

Progesterone is the primary endogenous progestin. Progesterone inhibits through positive feedback, the secretion of pituitary gonadotrophins, in turn, this prevents follicular maturation and ovulation or alternatively promotes it for the prime follicle.

USES: abnormal uterine bleeding, primary or secondary amenorrhea (used with an estrogen), endometriosis, alone or with an estrogen for contraception, may also be used in combination with an estrogen for endometriosis and hypermenorrhea.

CONTRAINDICATION: cancer of the breast or genital organs, thromboembolic disease, thrombophlebitis, vaginal bleeding of unknown origin, impaired liver function, cerebral hemorrhage or those with a history of such.

SPECIAL CONCERNS: use with caution in case of asthma, epilepsy, depression, migraine, and cardiac or renal dysfunction.

SIDE EFFECTS: see for individual drugs. Occasionally noted with short-term dosage, frequently observed with prolonged high dosage.

CNS – depression, insomnia, somnolence

GU – breakthrough bleeding, spotting, amenorrhea, changes in amount and/or duration of menstrual flow, changes in cervical secretions and cervical erosion, breast tenderness or secretions

SKIN – allergic rashes with and without pruritus, acne, melasma, chloasma, photosensitivity, local reactions at the site of injection

MISC – weight gain or loss, jaundice, masculinization of the female fetus, nausea, edema, and precipitation of acute intermittent porphyria, pyrexia, and hirsutism

NURSING CONSIDERATIONS
Assessment –
1. Identify indications for therapy. Assess for any thrombophlebitis, pulmonary embolism, cardiac, liver, or renal dysfunction, cerebral hemorrhage, breast or genital cancers
2. Monitor vital signs, EKG, weight and labs
3. Note any history of psychic depression or diabetes
4. Document last menstrual period

Client/Family Teaching
1. To avoid gastric irritation and nausea, take with a light snack, in the evening.
   Take at the same time each day
2. Gastric distress usually subsides after the first few cycles of the drug,
   report if these symptoms persist.
3. Report any symptoms of thrombic disorders such as pains in the legs, sudden
   onset of chest pain, and shortness of breath or coughing.
4. Weigh twice weekly and report any unusual weight gain/edema
5. Report any yellowing of the skin or eyes, which may necessitate discontinuing
   the drug, evaluation of liver function tests, and possibly a dosage change.
6. Report any unusual bleeding
7. May worsen psychic depression; report any mental status changes and the
   circumstance of the depression
8. With diabetes may alter glucose levels and the dosage of diabetic
   medications may need changed.
9. Report early symptoms of ophthalmic pathology, such as headache, dizziness,
   blurred vision, or partial loss of vision, and get a thorough eye pain.
**DEPO-PROVERA/MEDROXYPROGESTERONE**  
(Hormone)

**Indications:** A progestogens, which relieves dysfunctional uterine bleeding, amenorrhea and dysmenorrhea

**Action:** Progestogens mimic the body's production of progesterone to reestablish a normal menstrual cycle in patients with amenorrhea, they promote glandular and vascular development of the endometrium by restoring progesterone levels, progestogens suppress ovulation possibly by inhibiting pituitary gonadotrophin secretion, they form thick cervical mucus that is relatively impermeable to sperm

**Adverse Reactions:**  
**CNS:** Dizziness, migraine headache, lethargy, depression, nervousness, drowsiness, insomnia, fatigue  
**Cardiovascular:** Hypertension, edema, thrombophlebitis, pulmonary embolism, fluid retention, cerebral vascular disorders  
**EENT:** Photosensitivity  
**GI:** Nausea, vomiting, abdominal cramps, weight gain or weight loss, jaundice  
**GU:** Breakthrough bleeding, dysmenorrhea, amenorrhea, cervical erosion or abnormal secretions, uterine fibromas, vaginal candidiasis  
**Skin:** Melasma, rash, pruritus, acne, hair growth on faces of girls, alopecia, edema  
**Other:** Irritation and pain at injection site, hyperglycemia, breast tenderness, enlargement or secretion

**Dosages:** 5 mg - 10 mg daily for 5 - 10 days beginning the 16th day of the menstrual cycle. If the patient has received estrogen - 10 mg daily for 10 days beginning on the 16th day of the menstrual cycle tablets, intramuscular

**Nursing Considerations:** Contraindicated in thromboembolic disorders; undiagnosed abnormal vaginal bleeding; use cautiously if diabetes, seizure disorder, migraine, asthma, or mental illness; Federal Drug Administration (FDA) requires that before receiving the first dose, patients read the package insert explaining possible progestogen side effects, provide verbal explanation, also, patient should report any unusual symptoms immediately and
should stop the drug, call the Physician if visual disturbances or migraine occurs; due to the possibility of fluid retention, use with caution in patients with epilepsy, migraine, asthma, cardiac or renal dysfunction; arrangement of pretreatment and periodic at least annually, history and physical, blood pressure, breast, pelvic abdominal examination and a pap smear; prepare a calendar marking days drug is to be taken.
LAXATIVES

**Action/Kinetics:** laxatives act locally, either by stimulating the smooth muscle of the bowel or by changing the bulk or consistency of the stools. Laxatives can be divided into five categories.

**Stimulant laxatives:** substances that chemically stimulate the smooth muscles of the bowel to increase contractions, (Bisacodyl, Cascara, Danthron, and Senna).

**Saline laxatives** - substances that increase the bulk of the stools by retaining water, (Magnesium Salts and Sodium Phosphate)

**Bulk forming laxatives** - non digestible substances that pass through the stomach and then increase the bulk in the stools (Methylcellulose and Psyllium).

**Emollient and lubricant laxatives** - agents that soften hardened feces and facilitate their passage through the lower intestine (Docusate and Mineral Oil).

**Miscellaneous** - includes glycerin suppositories and lactulose.

**Uses** - See individualized drugs, short term treatment of constipation, prophylaxis in patients who should not strain during defecation (following ano rectal surgery, or after heart attack use fecal softeners or lubricant laxatives), to evacuate the colon for rectal and bowel examinations (certain lubricant, saline, and stimulant laxatives). In conjunction with surgery or anthelminitic therapy, the underlying cause of constipation should be determined since a marked change in bowel habits may be a symptom of a pathological condition.

**Contraindication:** Severe abdominal pain that might be caused by appendicitis, enteritis, ulcerative colitis, diverticulitis, intestinal obstruction, laxatives used in these conditions may cause rupture of the abdomen or intestinal hemorrhage, undiagnosed abdominal pain in children under the age of 2 can also be a contraindication.

**Side Effects:** GI: Excess activity of the colon resulting in nausea, diarrhea, griping or vomiting, perianal irritation, bloating, gas, electrolyte balance, dehydration. Miscellaneous - dizziness, fainting, weakness, sweating, palpitations.
Bulk Laxatives – Obstruction in the esophagus, stomach, small intestine or rectum, stimulant laxatives, chronic abuse may lead to a malfunctioning colon, mineral oil – large doses may cause anal seepage resulting in itching, irritation, hemorrhoids, and perianal discomfort, chronic use of laxatives may cause laxative dependency and result in chronic constipation and other intestinal disorders, because the patient may start to depend on the psychological effect and physical effect from the stimulus of the drug rather than on the body's own natural reflexes.

NURSING CONSIDERATIONS

Administering/Storage
When administering a laxative, note the length of time it takes for the laxative to take effect and give it so that the result of the laxative will not interfere with the patient's rest or digestion and absorption of nutrients.

Administer liquid laxatives at an agreeable temperature.

If laxative administered in a liquid, select one palatable to the patient.

If ordered to prepare for a diagnostic test, check directions carefully to ensure accurate administration.

Assessment
1. Determine length of use and underlying causes, note type taking and effectiveness.
2. With abdominal pain and discomfort, note location and type of discomfort experiencing. Rule out other intestinal disorders where laxatives should not be used.
3. Determine stool characteristics and frequency, patient definition if in fact constipation exists.
4. Note age, state of health, activity level, and general nutritional status.
5. Identify any special restrictions or limitation due to illness, may include sodium/fluid restriction.
6. List other drugs that may contribute to constipation (diuretics, anticholinergics, antihistamines, antidepressants, narcotic analgesics, iron products, and some hypertensive agents, especially Verapamil).
7. Identify recent life style changes that may contribute to the problem.
CLIENT/FAMILY TEACHING

1. Have a regular schedule for defecation, keep record of bowel function and response to all laxatives taken.
2. Laxatives reduce the amount of time other drugs remain in the intestine and may diminish effectiveness.
3. If taken as a prep for a diagnostic test, review instructions, if unable to read, find someone to review directions, to ensure an accurate test.
4. Review techniques that facilitate elimination, sitting with legs slightly elevated and leaning forward to increase abdominal pressure often encouraging elimination; if ill at home, consider a commode at the bedside, this will promote better bowel function by encouraging patient to move about and ensure privacy.
5. Bowel tone will be lost with longterm use of laxatives, bowel movements do not have to occur daily, use diet to achieve same purpose, two or three prunes a day are preferable to laxatives.
6. Frequent use of any type of enemas may cause damage to the rectum, and small bowel as well as inhibit bowel tone and may also cause electrolyte abnormalities.
7. Review importance of diet high in fiber foods (add juices, such as prune), daily exercise and benefits in maintaining proper bowel function, include bulk foods and sufficient fluids to diet to enhance elimination, consult dietician for assistance in meal planning/preparation and food selection.
8. Report if constipation persists because there could be a physiological problem that requires attention.
**BISACODYL**
*(Laxative)*

**Indication:** Chronic constipation

**Action:**
Unknown. Stimulant laxative that increases peristalsis, probably by direct effect on smooth muscle of the intestine, by irritating the muscle or stimulating the colonic intramural plexus. Drug also promotes fluid accumulation in colon and small intestine.

**Adverse Reactions:**
- CNS: Dizziness, faintness, muscle weakness with excessive use
- GI: Abdominal cramps, burning sensation in rectum with suppositories, nausea, vomiting, diarrhea with high doses, laxative dependence with long term or excessive use, protein losing enteropathy with excessive use
- Metabolic: Alkalosis, fluid and electrolyte imbalance, hypokalemia
- Musculoskeletal: Tetany

**Dosages:**
10 mg to 15 mg in evening or before breakfast. Up to 30 mg as needed or 10 mg per rectum for evacuation before examination or surgery for adults and children age 12 and older. Give 5 mg, oral or rectal at bedtime or before breakfast for children 6 to 12. Oral dose is not recommended if child cannot swallow tablet whole. Oral tablet onset is 6 to 12 hours and rectal onset is 15 to 60 minutes. Available forms are as follows: enema - 0.33 mg/ml, 10mg/5ml (microenema); powder for rectal solution - 1.5 mg Bisacodyl and 2.5 grams tannic acid; suppositories - 5 mg and 10 mg; and in tablets (enteric coated) - 5 mg. Orally the onset of action is within 6 - 12 hours and the peak and duration is variable. Rectally the onset is between 15 - 60 minutes and the peak and duration is also variable.

**Nursing Considerations:**
- Antacids may cause gastric irritation or dyspepsia from premature dissolution of enteric coating. Separate doses by at least 1 or 2 hours.
- Milk may cause gastric irritation or dyspepsia from premature dissolution of enteric coating. Do not use within 1 or 2 hours of drinking milk.
- May increase phosphate and sodium levels. May decrease calcium, magnesium, and potassium levels.
- Contraindicated in patients hypersensitive to drug or its components and in those with rectal bleeding, gastroenteritis, intestinal obstruction, abdominal pain, nausea, vomiting, or other symptoms of appendicitis or acute surgical abdomen.
- Give drug at times that do not interfere with scheduled activities or sleep. Soft, formed stools are usually produced 15 to 60 minutes after rectal use.
- Before giving for constipation, determine whether patient has adequate fluid intake, exercise and diet.
- Tablets and suppositories are used together to clean the colon before and after surgery and before barium enema.
- Insert suppository as high as possible into the rectum, and try to position suppository against the rectal wall. Avoid embedding with fecal material because doing so may delay onset of action.
- Bisco Lax may contain Tartrazine (yellow dye in food coloring).
- Advise patient to swallow enteric coated tablet whole to avoid GI (gastrointestinal) irritation. Instruct him not to take within 1 hour of milk or antacid.
- Tell patient that drug is for 1 week treatment only. (stimulant laxatives are often abused.) Discourage excessive use.
- Advise patient to report adverse effects to Physician.
- Teach patient about dietary sources of bulk, including bran and other cereals, fresh fruit, and vegetables.
- Tell patient to take drug with a full glass of water or juice.
FIBER-LAX/CALCIUM POLYCARBOPHIL
(Laxative)

Indication: Constipation, diarrhea from irritable bowel syndrome; acute, nonspecific diarrhea

Action: Bulk forming laxative that absorbs water and expands to increase bulk and moisture content of stools. The increased bulk encourages peristalsis and bowel movement. As an antidiarrheal, drug absorbs free fecal water, thereby producing formed stools.

Adverse Reactions: GI: Intestinal obstruction, abdominal fullness and increased flatus
Other: Laxative dependence with long term or excessive use

Dosages 1 gram orally once daily to four times a day as needed. Maximum 4 grams in a 24 hour period for adults and children older than 12. 500 mg once daily to three times a day as needed. Maximum 2 grams in a 24 hour period for children 7 to 12 years of age for constipation. For diarrhea doses may vary. Tablets available in 500 mg and 625 mg. For chewable tablets, there are available in 500 mg only. Onset of action is 12 to 24 hours, peak level is 3 days.

Nursing Considerations: Tetracyclines (antibiotics) may impair Tetracycline (antibiotic) absorption. Avoid using together.
- Contraindicated in patients with signs or symptoms of GI (gastrointestinal) obstruction or those with swallowing difficulty.
- Before giving drug for constipation, determine whether patient has adequate fluid intake, exercise and diet.
- In children younger than age 6, use must be directed by Physician.
- Rectal bleeding or failure to respond to therapy may indicate need for surgery.
- Full benefit of drug may take 1 to 3 days.
- Advise patient to chew tablets thoroughly before swallowing and to drink an 8 ounce glass of water with each dose. When drug is used as an antidiarrheal, tell patient not to drink the glass of water.
- Advise patient to seek medical attention if he experiences vomiting, chest pain, or difficulty breathing or swallowing after
taking medication.
- Teach patient about dietary sources of fiber, including bran and other cereals, fresh fruit, and vegetables.
- For severe diarrhea, advise patient to repeat dose every 30 minutes, but do not exceed maximum daily dose. Tell patient not to use for longer than 2 days, unless directed by a Physician.
GO-LYTELY/POLYETHYLENE GLYCOL AND ELECTROLYTE SOLUTION
(Laxative)

Indication: Bowel prep for GI (gastrointestinal) examination
Action: PEG 3350, a nonabsorbable solution, acts as an osmotic product. Sodium sulfate greatly reduces sodium absorption. The electrolyte level causes virtually no net absorption or secretion of ions
Adverse Reactions: EENT: Rhinorrhea
GI: Abdominal fullness, bloating, cramps, nausea, vomiting
Skin: Allergic reaction, anal irritation, dermatitis, urticaria
Dosages: 240 ml orally every 10 minutes until 4 liters are consumed or until watery stool is clear. Typically, give 4 hours before examination, allowing 3 hours for drinking and 1 hour for bowel evacuation. Sometimes given is smaller doses for constipation issues. There are many preparations for this product. It comes in a powder form where you add water and mix thoroughly. Onset is 1 hour and the peak and duration is variable
Nursing Considerations: Oral drugs may decrease absorption if given within 1 hour of starting therapy. Give at least 2 to 3 hours before starting therapy.
- Contraindicated in patients with GI (gastrointestinal) obstruction or perforation, gastric retention, toxic colitis, or megacolon.
- Use tap water to reconstitute powder. Shake vigorously to dissolve all powder. Refrigerate reconstituted solution, but use within 48 hours.
- Do not add flavoring or additional ingredients to the solution or give chilled solution. Hypothermia has been reported after ingesting large amounts of chilled solution.
- Give solution early in the morning if patient is scheduled for a mid morning examination. Oral solution induces diarrhea (onset 30 to 60 minutes) that rapidly cleans the bowel, usually within 4 hours.
- When using to prepare for barium enema, give solution the evening before the examination to avoid interfering with barium coating of the colonic mucosa.
- If given to semiconscious patient or to patient with impaired gag
reflex, take care to prevent aspiration.

- No major shifts in fluid or electrolyte balance have been reported.

- Patient preparation for barium enema may be less satisfactory with this solution because it may interfere with the barium coating of the colonic mucosa using the double contrast technique.

- Tell patient to fast for 3 to 4 hours before taking the solution, and thereafter to drink only clear fluids until examination is complete.

- Warn patient about adverse reactions.
MIRALAX/POLYETHYLENE GLYCOL
(Laxative)

Indication: Short term treatment of occasional constipation

Action: Causes water to be retained in stool

Adverse Reactions: GI: Abdominal bloating, cramping, diarrhea, excess stool frequency, flatulence, nausea

Dosages: 17 grams (about 1 heaping tablespoon) powder daily dissolved in 8 ounces (240 ml) of water, juice, soda, coffee, or tea. Available in bulk containers and the Physician will usually order 17 gram packets and then multiple of them if needed. Onset is 48 – 96 hours.

Nursing Considerations: This is the one laxative that is preferred by many Pediatricians for children with Batten Disease but you need to stick to a regimen.

-Drugs containing Miralax (laxative) may cause urticaria. Monitor patient.

-Contraindicated in patients allergic to drug and those with known or suspected bowel obstruction.

-Before giving, rule out bowel obstruction in patients who have nausea, vomiting, abdominal pain, or distention.

-It may take 2 to 4 days before a bowel movement occurs.

-Drug should be taken for 2 weeks or less to avoid the risk of laxative dependence.

-Occasional use as directed does not affect absorption or secretion of glucose or electrolytes.

-Prolonged, frequent, or excessive use may cause electrolyte imbalance and laxative dependence.

-Drug may be more likely to cause diarrhea in older patients.

-Explain that proper eating habits and lifestyle changes may produce more regular bowel movements. Tell patient to eat adequate amounts of dietary fiber, drink ample fluids, and get appropriate exercise.

-If patient uses bottled form of drug, urge him to measure each 17 gram dose using the measuring cup provided in the package.

-If patient uses drug packets, each one contains 17 grams.

-Instruct patient to dissolve dose in 8 ounces of water, juice, soda, coffee, or tea.
- Inform patient that it may take 2 to 4 days to produce a bowel movement.
- Warn patient that taking more than the recommended dose can cause dehydration and severe diarrhea.
- Tell patient that drug should be useful for 2 weeks or less to avoid the risk of laxative dependence.
- Urge patient to report unusual cramping, bloating, or diarrhea.
NARCOTICS

Therapeutic Actions
Narcotics act as agonists at specific opioid receptors in the CNS (central nervous system) to produce analgesia, euphoria, sedation; the receptors mediating these effects are thought to be the same as those editing the effects of endogenous opioids (enkephalins, endorphins).

Indications
Relief of moderate to severe acute and chronic pain
Preoperative medication to sedate and allay apprehension, facilitate induction of anesthesia, and reduce anesthetic dosage
Analgesic adjunct during anesthesia
A component of most preparations referred to as Brompton's Cocktail or Mixture, an oral alcoholic solution used for chronic severe pain, especially in terminal cancer patients
Intraspinal use with microinfusion devices for the relief of intractable pain
Unlabeled use relief of dyspnea associated with acute left ventricular failure and pulmonary edema

Contraindications/Cautions
Contraindications: hypersensitivity to narcotics, diarrhea caused by poisoning until toxins are eliminated, after biliary tract surgery or following surgical anastomoses. Use cautiously with head injury and increased intracranial pressure; acute asthma, COPD (chronic obstructive pulmonary disease), cor pulmonale, preexisting respiratory depression, hypoxia, hypercapnia (may decrease respiratory drive and increase airway resistance); acute abdominal conditions; cardiovascular disease, supraventricular tachycardias; myxedema; convulsive disorders; acute alcoholism; delirium tremors; cerebral arteriosclerosis; ulcerative colitis; fever; kyphoscoliosis; Addison's disease; prostatic hypertrophy; urethral stricture; recent GI (gastrointestinal) or GI (gastrointestinal) surgery; toxic psychosis; renal or hepatic dysfunction.

Adverse Effects
CNS: Light-headedness, dizziness, sedation, euphoria, dysphoria, delirium, insomnia, agitation, anxiety, fear, hallucinations, disorientation, drowsiness, lethargy, impaired mental and physical performance, coma, mood changes,
weakness, headache, tremor, convulsions, miosis, visual disturbances, suppression of cough reflex
GI: Nausea, vomiting, dry mouth, anorexia, constipation, biliary tract spasm, increased colonic motility in patients with chronic ulcerative colitis
CV: Facial flushing, peripheral circulatory collapse, tachycardia, arrhythmia, palpitations, chest wall rigidity, hypertension, hypotension, orthostatic hypotension, syncope
GU: Ureteral spasm, spasm of vesicle sphincters, urinary retention or hesitancy, oliguria, antidiuretic effect
Dermatologic: Pruritus, urticaria, laryngospasm, bronchospasm, edema
Local: Tissue irritation and induration (subcutaneous injection)
Major hazards: Respiratory depression, apnea, circulatory depression, respiratory arrest, shock, cardiac arrest
Other: Sweating, physical tolerance and dependence, psychological dependence

Clinically important interactions
Drug – Drug increased likelihood of respiratory depression, hypotension profound sedation, or coma in patients receiving barbiturate general anesthetics
Drug – Lab test elevated biliary tract pressure (an effect of narcotics) may cause increase in plasma amylase, lipase; determination of these levels may be unreliable for 24 hours

Nursing Considerations
Assessment
History - same as Contraindications
Physical - skin color, texture, lesions, orientation, reflexes, bilateral grip strength, affect; auscultation, blood pressure, orthostatic blood pressure, perfusion; adventitious bowel sounds, normal output, urinary frequency, voiding pattern, EKG, EEG, thyroid, liver, kidney function tests

Implementation
Caution patient not to chew or crush controlled release preparations
Dilute and administer IV slowly to minimize likelihood of adverse effects
Direct patient to lie down during IV administration
Provide narcotic antagonist, facilities for assisted or controlled respiration on standby during IV administration
Use caution when injecting SC or IM into chilled areas or in patients with hypotension or in shock; impaired perfusion may delay absorption; with repeated doses, an excessive amount may be absorbed when circulation is restored
Monitor injection sites for irritation, extravasation
Instruct postoperative patient in pulmonary toilet; drug suppresses cough reflex
Monitor bowel function, and arrange for anthraquinone laxative for severe constipation
Institute safety precautions (side rails, assist walking) if CNS (central nervous system), vision effects occur
Provide frequent, small meals if GI (gastrointestinal) upset occurs
Provide environmental control if sweating, visual difficulties occur
Provide back rubs, positioning, and other nondrug measures to alleviate pain
Reassure patient about addiction liability; most patients who receive opiates for medical reasons do not develop dependence syndromes

Drug specific teaching points
When used as preoperative medication, teaching about the drug should be incorporated into the teaching about the procedure
Take this drug exactly as prescribed. Avoid alcohol, antihistamines, sedatives, tranquilizers, OTC drugs
Possible side effects: nausea, loss of appetite (take the drug with food and lie quietly); constipation (notify health provider if this is severe; a laxative may help); dizziness, sedation, drowsiness, impaired visual acuity (avoid driving or performing other tasks requiring alertness, visual acuity)
Do not take any leftover medication for other disorders, and do not let anyone else take your prescriptions
Report severe nausea, vomiting, constipation, shortness of breath or difficulty breathing, skin rash
**CODEINE SULFATE**  
(Analgesics)

<table>
<thead>
<tr>
<th>Indication:</th>
<th>Mild to moderate pain and/or nonproductive cough</th>
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<tbody>
<tr>
<td>Action:</td>
<td>May bind with opiate receptors in the CNS, (central nervous system) altering perception of and emotional response to pain. Also suppresses the cough reflex by direct action on the cough center in the medulla</td>
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</tbody>
</table>
| Adverse Reactions: | CNS: Clouded sensation, sedation, dizziness, euphoria, light headedness, physical dependence  
| | CV: Bradycardia, flushing, hypotension  
| | GI: Constipation, dry mouth, ileus, nausea, vomiting  
| | GU: Urine retention  
| | Respiratory: Respiratory depression  
| | Skin: Diaphoresis, pruritus |
| Dosages: | 15 mg to 60 mg oral, IM or IV every 4 to 6 hours as needed.  
| | Maximum daily dose is 360 mg. Children older than 1, give 0.5 mg/kg oral, subcutaneous, IM, every 4 to 6 hours as needed. Do not give IV route to children. For cough, doses may vary. Available forms are injectable 15 mg/ml and 30 mg/ml; oral solution - 15mg/5 ml and 10 mg/ml and tablets 15 mg, 30 mg, and 60 mg. The oral route has an onset of 30 - 45 minutes with a peak of 1 - 2 hours and a duration of 4 - 6 hours. The IV route has an immediate onset with an immediate peak and a duration of 4 to 6 hour duration. The IM form has a 10 - 30 minute onset with a 30 to 60 minute peak and a 4 to 6 hour duration and the subcutaneous form has a 10 to 30 minute onset and a 4 to 6 hour duration. |
| Nursing Considerations: | CNS (central nervous system) Depressants, general Anesthetics, Hypnotics, MAO (Monoamine Oxidase) Inhibitors, other Opioid Analgesics, Sedatives, Tranquilizers, Tricyclic Antidepressants may cause additive effects. Use together cautiously; monitor patient response.  
| | -Alcohol use may cause additive effects. Discourage use together.  
| | -May increase amylase and lipase levels.  
| | -Contraindicated in patients hypersensitive to drug.  
| | -IV use contraindicated in children. |
-Use cautiously in elderly or debilitated patients and in those with head injury, Increased Intracranial Pressure, Increased Cerebral Spinal Fluid (CSF) pressure, Hepatic or Renal Disease, Hypothyroidism, Addison's disease, Acute Alcoholism, Seizures, severe CNS (central nervous system) Depression, Bronchial Asthma, Chronic Obstructive Pulmonary Disease (COPD), Respiratory Depression, and Shock.
-Reassess patient's level of pain at least 15 and 30 minutes after use.
-Codeine (narcotic - pain) and Aspirin (ASA) or Acetaminophen (Tylenol) are commonly prescribed together to provide enhanced pain relief.
-For full analgesic effect, give drug before patient has intense pain.
-Drug is an Antitussive and should not be used when cough is a valuable diagnostic sign or is beneficial as after thoracic surgery.
-Monitor cough and type and frequency.
-Monitor respiratory and circulatory status.
-Opiates may cause constipation. Assess bowel function and need for stool softeners or laxatives.
-Codeine (narcotic - pain) may delay gastric emptying, increase biliary tract pressure from contraction of the sphincter of Oddi, and interfere of the sphincter of Oddi, and interfere with the hepatobiliary imaging studies.
-Do not confuse Codeine (narcotic - pain) with Cardene (heart), Lodine (antiinflammatory), or Cordran (to treat a rash from steroid therapy).
-Advise patient that GI (gastrointestinal) distress caused by taking drug orally can be eased by taking drug with milk or meals.
-Instruct patient to ask for or to take drug before pain is intense.
-Caution ambulatory patient about getting out of bed or walking.
-Warn outpatient to avoid driving and other hazardous activities that require mental alertness until drug's effects on the CNS (central nervous system) are known.
-Advise patient to avoid alcohol during therapy.
DEMEROL/MEPERIDINE HYDROCHLORIDE

(Analgesics)

Indication: Moderate to severe pain, preoperative analgesia, and adjunct to anesthesia.

Action: Unknown. Binds with opiate receptors in the CNS (central nervous system), altering perception of and emotional response to pain.

Adverse Reactions: CNS: Clouded sensorium, dizziness, euphoria, lightheadedness, sedation, somnolence, seizures, hallucinations, headache, paradoxical anxiety, physical dependence, syncope, tremor
CV: Bradycardia, cardiac arrest, shock, hypotension, tachycardia
GI: Biliary tract spasms, constipation, dry mouth, ileus
GU: Urine retention
Musculoskeletal: Muscle twitching
Respiratory: Respiratory arrest, respiratory depression
Skin: Diaphoresis, pruritus, urticaria
Other: Induration, local tissue irritation, pain at injection site, phlebitis after IV delivery

Dosages: Children - 1.1 mg to 1.8 mg/kg oral, IM or subcutaneously every 3 to 4 hours. Maximum 100 mg every 4 hours as needed. Adults - 50 mg to 150 mg oral, IM or subcutaneously every 3 to 4 hours as needed. IV administration - keep opioid antagonist, Naloxone (Narcan), available. Give drug slowly by direct injection. Drug may also be given by slow continuous infusion. Drug is compatible with most solutions, including D5W, normal saline solution (.9), and Ringers or Lactated Ringers solutions. Protect from light and store at room temperature. Each indication may vary in dosing. Available forms: injection 10 mg/ml, 25 mg/ml, 50 mg/ml, 75 mg/ml, and 100 mg/ml; Syrup 50 mg/5 ml; tablets 50 mg and 100 mg. Oral route has an onset in 15 minutes with a peak in 60 - 90 minutes with a duration of 2 to 4 hours; IV route has an onset of 1 minute, peak in 5 to 7 minutes and a duration in 2 to 4 hours; IM has an onset in 10 to 15 minutes, peaks in 30 to 50 minutes and a duration of 2 to 4 hours and subcutaneously there are no values listed.

Nursing Considerations: Incompatibilities (Acyclovir - antiviral), Allopurinol
(Zyloprim - antigout), Aminophylline (relief of bronchospasm), Amobarbital (barbiturate no longer available in the US), Amphoteracin B (antifungal), Cefepime (Maxipime - antiinfective), Cefoperazone (Cefobid - antiinfective), Doxorubicin (antineoplastic), Liposomal (source for bodybuilding supplements and nutritional solutions in the body), Ephedrine, (bronchodilator), Furosemide (Lasix - diuretic), Heparin (anticoagulant), Hydrocortisone Sodium Succinate (Solu-Cortef - steroid), Idarubicin (antineoplastic), Imipenem (Primaxin - antiinfective) and Cilastatin Sodium, (antibiotic), Methylprednisolone Sodium Succinate (Medrol - steroid), Morphine (narcotic - pain), Pentobarbital (Nembutal - sedative), Phenobarbital Sodium (anticonvulsant/sedative), Phenytoin (Dilantin - anticonvulsant), Sodium Bicarbonate, (Alkalinizer - buffer in acid-base system), Sodium Iodide (antithyroid), Thiopental (Sodium Pentothal - anesthetic).

-Aminophylline (Bronchodilator), Barbiturates, Heparin (anticoagulant), Methicillin (antibiotic), Morphine Sulfate (narcotic - pain), Phenytoin (Dilantin - anticonvulsant), Sodium Bicarbonate, (Alkalinizer - buffer in acid-base system), Sulfonamides incompatible when mixed in same IV container. Avoid using together.

-Chlorpromazine (Thorazine - antipsychotic) may cause excessive sedation and hypotension. Avoid using together.

-Cimetadine (Tagamet - stomach) may increase respiratory and CNS (central nervous system) depression. Monitor patient closely.

-CNS (central nervous system) Depressants, General Anesthetics, Hypnotics, other Opioid Analgesics, Phenothiazines, Sedatives, Tricyclic Antidepressants may cause Respiratory Depression, Hypotension, Profound Sedation, or Coma. Use together with caution; reduce Demerol (narcotic - pain) dosage.

-MAO (Monoamine Oxidase) Inhibitors may increase CNS (central nervous system) excitation or depression that can be severe or fatal. Avoid using together.

-Phenytoin (Dilantin - anticonvulsant) may decrease Demerol (narcotic - pain) level. Watch for decreased analgesia.
-Protease inhibitors may increase respiratory and CNS (central nervous system) depression. Avoid using together.
-Ritonavir (Norvir – antiretroviral) may significantly increase level and toxic effects of Demerol (narcotic – pain). Avoid using together.
-Alcohol use may cause additive effects. Discourage use together.
-May increase amylase and lipase levels.
-Contraindicated in patients hypersensitive to drug and in those who have received MAO (Monoamine Oxidase) Inhibitors within past 14 days.
-Avoid use in patients with endstage renal disease.
-Use with caution in elderly and debilitated patients and in those with Increased Intracranial Pressure, Head Injury, Asthma and other respiratory conditions, Supraventricular Tachycardias, Seizures, Acute Abdominal Conditions, Hepatic or Renal Disease, Hypothyroidism, Addison disease, Urethral Stricture, and Prostatic Hyperplasia.
-In elderly patients or in those with renal dysfunction, active metabolite may accumulate, causing increased adverse CNS (central nervous system) reactions.
-Drugs may be used in some patients who are allergic to Morphine (narcotic – pain).
-Reassess patient’s level of pain at least 15 and 30 minutes after administration.
-Subcutaneous injection is not recommended because it is very painful, but it may be suitable for occasional use. Monitor patient for pain at injection site, local tissue irritation, and induration after subcutaneous injection.
-Oral dose is less than half as effective as parenteral dose. Give IM (intramuscular) if possible. When changing from parenteral to oral route, increase dosage.
-Syrup has local anesthetic effect. Give with full glass of water.
-Because drug toxicity frequently appears after several days of treatment, drug is not recommended for treatment of chronic pain.
-Monitor respiratory and CV (cardiovascular) status carefully. Do not give if respirations are below 12 breaths/minute, if
respiratory rate or depth is decreased, or if change in pupils is noted.
- If drug is stopped abruptly after long term use, monitor patient for withdrawal symptoms.
- In postoperative patients, monitor bladder function.
- Monitor bowel function. Patient may need a laxative or stool softener.
- Do not confuse Demerol (narcotic – pain) with Demulen (Ortho Cept – hormone).
- Encourage postoperative patient to turn, cough, deep breathe, and use an incentive spirometer to prevent lung problems.
- Caution ambulatory patient about getting out of bed or walking.
- Warn outpatient to avoid driving and other potentially hazardous activities that require mental alertness until drug’s system effects are known.
- Advise patient to avoid alcohol during therapy.
- Caution patient that drug is not intended for long term use.
DILAUDID/HYDROMORPHONE HYDROCHLORIDE
(Analgesics)

Indication: Moderate to severe pain and cough
Action: Unknown. Binds with opiate receptors in the CNS (central nervous system), altering perception of and emotional response to pain. Also suppresses the cough reflex by direct action on the cough center in the medulla.

Adverse Reactions: CNS: Sedation, somnolence, clouded sensorium, dizziness, euphoria, lightheadedness
CV: Hypotension, flushing, bradycardia
EENT: Blurred vision, diplopia, nystagmus
GI: Nausea, vomiting, constipation, ileus, dry mouth
GU: Urine retention
Respiratory: Respiratory depression, bronchospasm
Skin: Diaphoresis, pruritus
Other: Induration with repeated subcutaneous injections, physical dependence

Dosages: For adults - 2 mg - 4 mg orally every 4 to 6 hours as needed or 1 mg to 4 mg IM, subcutaneously or IV (slowly over at least 2 to 5 minutes) every 4 to 6 hours as needed, or 3 mg rectally (suppository every 6 to 8 hours as needed. Adults and children over 12 years of age - 1 mg cough syrup orally every 3 to 4 hours as needed, or children 6 to 12 years - 0.5 mg cough syrup orally every 3 to 4 hours as needed. IV administration - for infusion, drug may be mixed in D5W, normal saline solution, D5.9, D545, Ringers, or Lactated Ringers solutions. Give by direct injection over no less than 2 minutes. Respiratory depression and hypotension can occur. Give slowly, and monitor patient constantly. Keep resuscitation equipment available. Available forms: cough syrup 1 mg/5 ml; injection 1 mg/ml, 2 mg/ml, 3 mg/ml, 4 mg/ml and 10 mg/ml; liquid 5 mg/ml; powder for injection 10 mg/ml; suppositories 3 mg; tablets 1 mg, 2 mg, 3 mg, 4 mg, and 8 mg. The oral route has an onset of 15 - 30 minutes with a peak of 30 - 60 minutes with a duration of 4 - 5 hours; the IV route has an onset of 10 - 15 minutes with a peak of 15 - 30 minutes and a duration of 2 - 3 hours; the IM route has an onset of 15 minutes with a peak of 30 - 60 minutes and a
duration of 4 - 5 hours; the subcutaneous route has an onset of 15 minutes with a peak of 30 - 90 minutes with a duration of 4 hours; and the rectal route has a duration of 4 hours.

Nursing Considerations: Incompatibilities - Alkalies, Amphotericin B cholesterol complex (antifungal), Ampicillin sodium (antibiotic), Bromides, Cefazolin (antibiotic), Dexamethasone (Decadron - steroid), Diazepam (Valium - anticonvulsant/antianxiety), Gallium nitrate, Haloperidol (Haldol - antipsychotic), Heparin sodium (anticoagulant), Iodides (antithyroid), Minocycline (antibiotic), Phenobarbital Sodium (Luminal - anticonvulsant/sedative), Phenytoin sodium (Dilantin - anticonvulsant), Prochlorperazine Edisylate (Compazine - antiemetic), Sargramostim (Leukine - hematopoietic), Sodium Bicarbonate (alkalinizer - buffer in the acid-base system), Sodium Phosphate (Fleet enema), and Thiopental (Sodium Pentathal - anesthetic).

-CNS (central nervous system) Depressants, General Anesthetics, Hypnotics, MAO (Monoamine Oxidase) Inhibitors, other Opioid Analgesics, Sedatives, Tranquilizers, Tricyclic Antidepressants may cause additive effects. Use together with caution; reduce Dilaudid (narcotic - pain) dose and monitor patient response.

-Alcohol use may cause additive effects. Advise patient to use together cautiously.

-May increase amylase and lipase levels.

-May interfere with hepatobiliary imaging studies because delayed gastric emptying and contraction of sphincter of Oddi may increase biliary tract pressure.

-Contraindicated in patients hypersensitive to drug; in those with intracranial lesions that cause Increased Intracranial Pressure; and in those with depressed ventilation, such as in Status Asthmaticus, COPD (Chronic Obstructive Pulmonary Disease), Cor Pulmonale, Emphysema, and Kyphoscoliosis.

-Use with caution in elderly or debilitated patients and in those with Hepatic or Renal Disease, Hypothyroidism, Addison disease, Prostatic Hyperplasia, or Urethral Stricture.

-Reassess patient’s level of pain at least 15 and 30 minutes after administration.

-For better analgesic effect, give drug on a regular schedule,
before patient has intense pain.
-Dilaudid-HP (narcotic - pain), a highly concentrated form (10 mg/ml) may be given in smaller volumes to prevent the discomfort of large volume IM or subcutaneous injections. Check dosage carefully.
-Rotate injection sites to avoid induration with subcutaneous injection.
-Monitor respiratory and circulatory status and bowel function.
-Keep opioid antagonist (Naloxone - Narcan - reverses extreme side effects of narcotics) available.
-Drug may worsen gallbladder pain.
-Drug is a commonly abused opioid.
-Cough syrup may contain Tartrazine (yellow dye in food coloring).
-Do not confuse Hydromorphone (Dilaudid - narcotic - pain) with Morphine (narcotic - pain) or Oxymorphone (Numorphan - Narcotic - pain) or Dilaudid (narcotic - pain) with Dilantin (anticonvulsant).
-Instruct patient to request or take drug before pain becomes intense.
-Tell patient to store suppositories in refrigerator.
-Advise patient to take drug with food if GI (gastrointestinal) upset occurs.
-When used after surgery, encourage patient to turn, cough, and breathe deeply to avoid lung problems.
-Caution patient about getting out of bed or walking. Warn outpatient to avoid hazardous activities that require mental alertness until drug’s CNS (central nervous system) effects are known.
-Advise patient to avoid alcohol during therapy.
DURAGESIC/FENTANYL TRANSDERMAL
(Analgesics)

Indication: Adjunct to general anesthesia, adjunct to regional anesthesia, to induce and maintain anesthesia, postoperative pain, restlessness, tachypnea, and emergency delirium, preoperative medication, short term management of acute post operative pain in patients requiring Opioid analgesia during hospitalization, to manage persistent, moderate to severe chronic pain in Opioid tolerant patients who require around the clock Opioid analgesics for an extended time, and to manage breakthrough pain in patients already receiving and tolerating an Opioid.

Action: Unknown. Binds with Opiate receptors in the CNS (central nervous system), altering perception of an emotional response to pain.

Adverse Reactions: CNS: Asthenia, clouded sensorium, confusion, euphoria, sedation, somnolence, seizures, anxiety, depression, dizziness, hallucinations, headache, nervousness
CV: Arrhythmias, chest pain, hypertension, hypotension
GI: Constipation, abdominal pain, anorexia, diarrhea, dyspepsia, dry mouth, ileus, nausea, vomiting
GU: Urine retention
Musculoskeletal: Skeletal muscle rigidity (dose related)
Respiratory: Apnea, hypoventilation, respiratory depression, dyspnea
Skin: Diaphoresis, pruritus, erythema at application site transdermal
Other: Physical dependence

Dosages: For children - 2 to 12 years of age - 2 mcg/kg to 3 mcg/kg. For each indication, dosages vary. For the patch system, usually start low and increase as needed. Available forms: injectable - 50 mcg/ml; transdermal system - patches that release 12.5 mcg, 25 mcg, 50 mcg, 75 mcg or 100 mcg of drug per hour; transmucosal - 100 mcg, 200 mcg, 400 mcg, 600 mcg, 800 mcg, 1200 mcg, or 1600 mcg. The IV route has an onset of 1 - 2 minutes with a peak of 3 - 5 minutes and duration of 30 - 60 minutes; IM has an onset of 7 - 15 minutes, 20 - 30 minutes with a duration of 1 - 2 hours; and transdermal has an onset of 12 -
24 hours with a peak of 1 - 3 days.

Nursing Considerations: Amiodarone (Cordarone - heart) may cause hypotension, bradycardia, and decreased cardiac output. Monitor patient closely.

-CNS (central nervous system) Depressants, General Anesthetics, Hypnotics, MAO (Monoamine Oxidase) Inhibitors, other Opioid Analgesics, Sedatives, Tricyclic Antidepressants may cause additive effects. Use together cautiously. Reduce dosages of these drugs and reduce Fentanyl (anesthesia - pain) dose by one fourth to one third.

-CYP3A4 inducers (Carbamazepine (Tegretol - anticonvulsant), Phenytoin (Dilantin - anticonvulsant), Rifampin (antitubercular) may decrease analgesic effects. Monitor patient for adequate pain relief.


-Droperidol (Inapsine - antiemetic) may cause hypotension and decrease pulmonary arterial pressure. Use together cautiously.

-Potent CYP3A4 inhibitors (Clarithromycin (Biaxin), Erythromycin (both antibiotics), Itraconazole (Sporonox), Ketoconazole (Nizoral) both antifungals, Nefazodone (Serzone - antidepressant - not recommended for children with Batten Disease), Nelfinavir (Viracept - antiretroviral), Ritonavir, (Norvir - antiretroviral), Troleandomycin (antibiotic no longer available in the US) may cause increased analgesia, CNS (central nervous system) depression, and hypotensive effects. Monitor patient’s respiratory status and vital signs.

-Protease inhibitors may increase Fentanyl (narcotic - pain) levels and adverse effects. Monitor patient closely for respiratory depression.

-May increase amylase and lipase levels.

-Contraindicated in patients intolerant to drug.

-Transdermal form is contraindicated in patients hypersensitive to adhesives, those who are not Opioid tolerant, those who need post operative pain management, and those with acute, mild, or intermittent pain that can be managed with Nonopioids. Do not
use in patients with Increased Intracranial Pressure, Head Injury, Impaired Consciousness, or Coma.

-Actiq (is the transmucosal form of Fentanyl) is contraindicated in children and in those who need acute or postoperative pain management.

-Use with caution in patients with brain tumors, COPD (Chronic Obstructive Pulmonary Disease), Decreased Respiratory Reserve, potentially compromised respiratory, Hepatic or Renal Disease, or Cardiac Bradyarrhythmias.

-Use with caution in elderly or debilitated patients.

-For better analgesic effect, give drug before patient has intense pain.

-High doses can produce muscle rigidity, which can be reversed with neuro muscular blockers; however, patient must be artificially ventilated.

-Monitor circulatory and respiratory status and urinary function carefully. Drug may cause respiratory depression, hypotension, urine retention, nausea, vomiting, ileus, or altered level of consciousness, no matter how it is given.

-Periodically monitor postoperative vital signs and bladder function. Because drug decreases both rate and depth of respirations, monitoring of arterial oxygen saturation (SaO2) may help assess respiratory depression. Immediately report respiratory rate below 12 breaths/minute, decreased respiratory volume, or decreased SaO2.

-Drug may cause constipation. Assess bowel function and need for stool softeners or laxatives.

Transdermal form

-Dosage equivalent charts are available to calculate the Fentanyl (anesthetic – pain) transdermal dose based on the daily Morphine (narcotic – pain) intake; for example, for every 90 mg of oral Morphine (narcotic – pain) or 15 mg of IM Morphine (narcotic – pain) per 24 hours, 25 mcg/hour of transdermal Fentanyl (anesthetic – pain) is needed.

-Transdermal drug levels peak between 24 and 72 hours after initial application and dose increases. Monitor patients for life threatening hypoventilation, especially during these times.

-Make dosage adjustments gradually in patient using the
transdermal system. Reaching steady state level of a new dosage may take up to 6 days; delay dosage adjustment until after at least two applications.

- Monitor patient who develops adverse reactions to the transdermal system for at least 12 hours after removal. Drug level drops gradually and may take as long as 17 hours to decline by 50%.
- Most patients experience good control of pain for 3 days while wearing the transdermal system, but a few may need a new application after 48 hours.
- Because the drug level rises for the first 24 hours after application, analgesic effect can not be evaluated on the first day. Make sure patient has adequate supplemental analgesic to prevent breakthrough pain.
- When reducing Opioid therapy or switching to a different analgesic, withdraw the transdermal system gradually. Because the drug level drops gradually after removal, give half the equianalgesic dose of the new analgesic 12 to 18 hours after removal.
- Only the patient should activate the Ionsys transdermal system.

Transmucosal form
- Fentora and Actiq (pain) are used only to manage breakthrough cancer pain in patients who are already receiving and tolerating Opioids.
- Fentora and Actiq (pain) are not bioequivalent and can not be substituted a mcg per mcg basis.
- Remove foil just before giving.
- Place tablet or lozenge between the cheek and gum and allow to dissolve over about 15 to 20 minutes. Actiq (pain) may be moved from one side to the other using the stick. Do not allow patient to bite, suck, or chew the tablets or lozenge. Discard Actiq (pain) stick in the trash after use or, if any drug matrix remains on the stick, place under hot running tap water until dissolved or place in child resistant container provided, and discard as appropriate for schedule II drugs.
- Do not confuse Fentanyl (anesthetic – pain) with Alfentanil (Alfenta - potent synthetic Opioid Analgesic).
- When drug is used for pain control, instruct patient to request drug before pain becomes intense.
- Inform family members only the patient should activate the Ionsys system for pain control to decrease the risk of fatal respiratory depression.
- When drug is used after surgery, encourage patient to turn, cough, and breathe deeply to prevent lung problems.
- Instruct patient to avoid hazardous activities until CNS (central nervous system) effects subside.
- Tell home care patient to avoid drinking alcohol or taking other CNS (central nervous system) type drugs because additive effects can occur.
- Advise patient not to stop drug abruptly.
- Teach patient about proper application of transdermal patch. Tell patient to clip hair at application site, but not to use a razor, which may irritate skin. Wash area with clear water, if needed, but not with soaps, oils, lotions, alcohol, or other substances that may irritate skin or prevent adhesion. Dry area completely before application.
- Tell patient to remove transdermal system from package just before applying, hold in place for 30 seconds, and be sure the edges of patch stick to skin.
- Teach patient not to alter the transdermal patch (such as by cutting it) before applying.
- Advise parent or caregiver to place transdermal patch on the upper back for a child or a patient who is cognitively impaired, to reduce the chance the patch will be removed and placed in the mouth.
- Teach patient to dispose of the transdermal patch by folding it so the adhesive adheres to itself and then flushing it down the toilet.
- Tell patient that, if another patch is needed after 48 to 72 hours, he should apply it to a different skin site.
- Tell patient that pain relief with the patch may not occur for several hours after the patch is applied. Oral, immediate release opioids may be needed for initial pain relief.
- Inform patient that heat from fever or environment, such as from heating pads, electric blankets, heat lamps, hot tubs, or
water beds, may increase transdermal delivery and cause toxicity requiring dosage adjustment. Instruct patient to notify Physician if fever occurs or if he will be spending time in a hot climate.

- Warn patient and patient’s family that the amount of drug in one Actiq lozenge or Fentora (both pain) tablet can be fatal to a child. Keep well secured and out of children's reach.
METHADONE/METHADONE HYDROCHLORIDE
(Analgesics)

Indication: Severe pain, severe chronic pain, and opioid withdrawal syndrome

Action: Unknown. Binds with opiate receptors in the CNS (central nervous system), altering perception of and emotional response to pain.

Adverse Reaction: CNS: Clouded sensorium, dizziness, lightheadedness, sedation, somnolence, seizures, agitation, choreic movements, euphoria, headache, insomnia, syncope
CV: Arrhythmias, bradycardia, cardia arrest, shock, edema, hypotension, palpitations
EENT: Visual disturbances
GI: Nausea, vomiting, anorexia, biliary tract spasm, constipation, dry mouth, ileus
GU: Urine retention
Respiratory: Respiratory arrest, respiratory depression
Skin: Diaphoresis, pruritus, urticaria
Other: Induration, pain at injection site, physical dependence, tissue irritation

Dosages: 2.5 mg to 10 mg oral, IM, or subcutaneous every 3 to 4 hours as needed for adults. Each indication, doses may vary. Available forms: dispersible tablets (for methadone therapy) 40 mg; injection 10 mg/ml; oral solution 5 ml/5 ml, 10 mg/5ml, and 10 mg/ml (concentrate); tablets 5 mg and 10 mg. Oral route - onset is 30 to 60 minutes with a peak of 90 to 120 minutes and a duration of 4 to 6 hours; IM route has an onset of 10 to 20 minutes, peak in 1 to 2 hours and duration of 4 - 5 hours.

Nursing Considerations: Ammonium chloride, other urine acidifiers, Phenytoin (Dilantin - anticonvulsant) may reduce Methadone effect. Watch for decreased pain control.
-CNS (central nervous system) Depressants, General Anesthetics, Hypnotics, MAO (Monoamine Oxidase) Inhibitors, Sedatives, Tranquilizers, Tricyclic Antidepressants may cause Respiratory Depression, Hypotension, Profound Sedation, or Coma.
Use together with caution. Monitor patient response.
-Nonnucleoside reverse transcriptase inhibitors (Delavirdine -
antiretroviral), Efavirenz (antiretroviral), Nevirapine (antiretroviral), Protease Inhibitors (Lopinavir, Ritonavir, Nelfinavir - all antiinfectives), Rifamycins may increase Methadone metabolism causing Opiate withdrawal symptoms. Monitor patient and adjust dose as needed.

-Protease inhibitors, Cimetidine (Tagamet - stomach), Fluvoxamine (Luvox - antidepressant), may increase respiratory and CNS (central nervous system) depression. Monitor patient closely.

-Alcohol use may cause additive effects. Discourage use together.

-Contraindicated in patients hypersensitive to drug.

-Use with caution in elderly or debilitated patients and in those with Acute Abdominal Conditions, Severe Hepatic or Renal Impairment, Hypothyroidism, Addison disease, Prostatic Hyperplasia, Urethral Stricture, Head Injury, Increased Intracranial Pressure, Asthma, and other Respiratory Conditions.

-Reassess patient’s level of pain at least 15 and 30 minutes after parenteral administration and 30 minutes after 30 minutes after oral administration.

-When used in Opioid withdrawal syndrome, daily doses of more than 120 mg require special state and federal approval.

-Oral liquid form legally required in maintenance programs. Completely dissolve tablets in ½ cup of orange juice or powdered citrus drink.

-For parenteral use, IM injection is preferred. Rotate injection sites.

-Monitor patient for pain at injection site, tissue irritation, and induration after subcutaneous injection.

-Oral dose is ½ as potent as injected dose.

-An around the clock regimen is needed to manage severe, chronic pain.

-Patient treated for Opioid withdrawal syndrome usually needs an additional analgesic if pain control is needed.

-Monitor patient closely because drug has cumulative effect; marked sedation can occur after repeated doses.

-Monitor circulatory and respiratory status and bladder and
bowel function. Patient may need a stool softener or laxative.
-When used as an adjunct on the treatment of opioid addiction (maintenance), withdrawal is usually delayed and mild.
-High doses of Methadone may cause or contribute to torsades de pointes and a prolonged QT interval.
-Caution ambulatory patient about getting out of bed or walking.
-Warn outpatient to avoid hazardous activities that require mental alertness until drug's CNS (central nervous system) effects are known.
-Instruct patient to increase fluid and fiber in diet, if not contraindicated, to combat constipation.
-Advise patient to avoid alcohol during therapy.
MORPHINE/MORPHINE SULFATE
(Analgesics)

Indication: Severe pain, moderate to severe pain requiring continuous, around the clock opioid, and single dose, epidural extended pain relief after major surgery

Action: Unknown. Binds with opiate receptors in the CNS (central nervous system), altering perception of and emotional response to pain.

Adverse Reactions: CNS: Dizziness, euphoria, lightheadedness, nightmares, sedation, somnolence, seizures, depression, hallucinations, nervousness, physical dependence, syncope
CV: Bradycardia, cardiac arrest, shock, hypertension, hypotension, tachycardia
GI: Constipation, nausea, vomiting, anorexia, biliary tract spasms, dry mouth, ileus
GU: Urine retention
Hematologic: Thrombocytopenia
Respiratory: Apnea, respiratory arrest, respiratory depression
Skin: Diaphoresis, edema, pruritus, and skin flushing

Dosages: 0.1 mg to 0.2 mg/kg subcutaneously or IM every 4 hours.
Maximum single dose 15 mg. For adults - 5 mg to 20 mg subcutaneously or IM or 2.5 mg to 15 mg IV every 4 hours as needed or 5 mg to 30 mg oral or 10 mg to 20 mg rectal every 4 hours as needed. For continuous IV infusion, give loading dose of 15 mg IV then continuous infusion of 0.8 mg to 10 mg/hour.
For extended release tablet, give 15 mg or 30 mg oral every 8 to 12 hours. For extended release Kadian capsules used as a first opioid, give 20 mg oral every 12 hours or 40 mg oral once daily; increase conservatively in opioid naive patients. For epidural injection, give 5 mg by epidural catheter; then if pain is not relieved adequately in 1 hour, give supplementary doses of 1 mg to 2 mg at intervals sufficient to assess effectiveness.
Maximum total epidural dose should not exceed 10 mg/24 hours.
For intrathecal injection, a single dose of 0.2 mg to 1 mg may provide pain relief for 24 hours (only in the lumbar area). Do not repeat injections). Each indication may vary in dosages.
Available forms of Morphine Sulfate - capsules - 15 mg and 30
mg; capsules, extended release beads - 30 mg, 60 mg, 90 mg and 120 mg; capsules - extended release pellets - 20 mg, 30 mg, 50 mg, 60 mg, 80 mg, and 100 mg; injection with preservative - 0.5mg/ml, 1mg/ml, 2 ml, 4mg/ml, 5mg/ml, 8mg/ml, 10mg/ml, 15mg/ml, 25mg/ml, and 50mg/ml; injection without preservative - 0.5mg/ml, 1mg/ml, 10mg/ml, 15mg/ml, and 25mg/ml; oral solution - 10mg/5ml, 20mg/5ml, 20mg/ml (concentrate), 100mg/5ml (concentrate); soluble tablets - 10 mg, 15 mg, 30 mg; suppositories - 5 mg, 10 mg, 20 mg, and 30 mg; tablets - 15mg, and 30mg; tablets extended release - 15mg, 30mg, 60mg, 100mg, and 200mg. The oral route has an onset of 1 hour with a peak of 1 - 2 hour and a duration of 4 - 12 hour; oral Morphine Sulfate) has an onset of 30 minutes, and a duration of 24 hours; IV route has an onset of 5 minutes, peaks in 20 minutes, and duration is 4 - 5 hours; IM has an onset in 10 - 30 minutes, peaks in 30 - 60 minutes and has a duration of 4 - 5 hours; subcutaneous has an onset of 10 - 30 minutes, peaks in 50 - 90 minutes and has a duration of 4 - 5 hours; rectal has an onset of 20 - 60 minutes, peaks in 20 - 60 minutes, and has a duration of 4 - 5 hours; epidural has an onset of 15 - 60 minutes, peaks in 15 - 60 minutes and has a duration of 24 hours; and an intrathecal has an onset of 15 - 60 minutes, peaks in 30 - 60 minutes and a duration of 24 hours.

Nursing Considerations: Incompatibilities - Aminophylline (Bronchodilator), Amobarbital (barbiturate no longer available in the US, Cefepime (Maxapime - antiinfective), Chlorothiazide (Diuril - diuretic), Fluorouracil - Adrucil - antineoplastic), Haloperidol (Haldol - antipsychotic), Heparin Sodium - anticoagulant) Meperidine (Demerol - narcotic - pain), Pentobarbital, (Nembutal - sedative), Phenobarbital Sodium (Luminal - anticonvulsant/sedative), Phenytoin Sodium (Dilantin - anticonvulsant), Prochlorperazine, Compazine - antiemetic), Promethazine Hydrochloride (Phenergan - antiemetic), Sodium Bicarbonate (alkalinizer - buffer for the acid-base system), Thiopental (Sodium Pentothal - anesthetic).

-Cimetidine (Tagamet - stomach) may increase respiratory and CNS (central nervous system) depression when given with Morphine (narcotic - pain) sulfate. Monitor patient closely.
- CNS (central nervous system) Depressants, General Anesthetics, Hypnotics, MAO (Monoamine Oxidase) Inhibitors, other Opioid Analgesics, Sedatives, Tranquilizers, Tricyclic Antidepressants may cause Respiratory Depression, Hypotension, Profound Sedation or Coma. Use together with caution, reduce Morphine (narcotic - pain) dose, and monitor patient response.
- Alcohol use may cause the extended release capsules' protective coating to fail, causing overdose. Warn patient to avoid alcohol.
- May increase amylase level. May decrease hemoglobin level (Morphine Sulfate - narcotic - pain).
- May decrease platelet count. May cause abnormal liver function test values (Morphine Sulfate - narcotic - pain).
- Contraindicated in patients hypersensitive to drug and in those with conditions that would preclude administration of Opioids by IV route (Acute Bronchial Asthma or Upper Airway Obstruction).
- Contraindicated in patients with GI (gastrointestinal) obstruction.
- Use with caution in elderly or debilitated patients and in those with Head Injury, Increased Intracranial Pressure, Seizures, Chronic Pulmonary Disease, Prostatic Hyperplasia, Severe Hepatic or Renal Disease, Acute Abdominal Conditions, Hypothyroidism, Addison's Disease and Urethral Stricture.
- Use with caution in patients with Circulatory Shock, Biliary Track Disease, CNS (central nervous system) Depression, Toxic Psychosis, Acute Alcoholism, Delirium Tremens, and Seizure Disorders.
- Reassess patient's level of pain at least 15 and 30 minutes after giving parenterally and 30 minutes after giving orally.
- Keep opioid antagonist (Naloxone - Narcan - to reverse severe side effects of narcotics) and resuscitation equipment available.
- Monitor circulatory, respiratory, bladder, and bowel functions carefully. Drug may cause respiratory depression, hypotension, urine retention, nausea, vomiting, ileus, or altered level of consciousness regardless of the route. If respirations drop below 12 breaths/minute, withhold dose and notify Physician.
-Oral solutions of various concentrations and an intensified oral solution (20 mg/ml) are available. Carefully note the strength given.

-Oral capsules may be carefully opened and the entire contents poured into cool soft foods, such as water, orange juice, applesauce, or pudding; patient should consume mixture immediately.

-For sublingual (SL) use, measure oral solution with tuberculin syringe. Give dose a few drops at a time to allow maximum sublingual absorption and minimize swallowing.

-Preservative free preparations are available for epidural and intrathecal use.

-When drug is given epidurally, monitor patient closely for respiratory depression up to 24 hours after the injection. Check respiratory rate and depth every 30 to 60 minutes for 24 hours. Watch for pruritus and skin flushing.

-Morphine (narcotic - pain) is drug of choice in relieving myocardial infarction (MI - heart attack) pain; may cause transient decrease in blood pressure.

-An around the clock regimen best manages severe, chronic pain.

-Morphine (narcotic - pain) may worsen or mask gallbladder pain.

-Constipation is commonly severe with maintenance dose. Ensure that stool softener or other laxative is ordered.

-Give Morphine Sulfate (narcotic - pain) without regard to food.

-Taper Morphine Sulfate (narcotic - pain) therapy gradually when stopping therapy.

-Refrigeration of rectal suppositories is not needed.

-Do not confuse Morphine (narcotic - pain) with Hydromorphone (Dilaudid - narcotic - pain).

-When drug is used after surgery, encourage patient to turn, cough, deep breathe, and use incentive spirometer to prevent lung problems.

-Caution ambulatory patient about getting out of bed or walking. Warn outpatient to avoid driving and other potentially hazardous activities that require mental alertness until drug's adverse CNS (central nervous system) effects are known.

-Drinking alcohol or taking drugs containing alcohol while taking extended release capsules may cause the drug's protective
coating to fail, releasing a potentially fatal dose of Morphine (narcotic - pain).
 Warn patient to read labels on OTC (over the counter) drugs carefully and not to use alcohol in any form.
 -Tell patient to swallow Morphine Sulfate (narcotic - pain) whole or to open capsule and sprinkle beads or pellets on a small amount of applesauce taking.
 -Warn patient not to crush, break, or chew extended release form.
PERCOSET (ROXINOL)/OXYCODONE HYDROCHLORIDE
(Analgesic)

Indication: Moderate to severe pain

Action: Unknown. Binds with opiate receptors in the CNS (central nervous system), altering perception of and emotional response to pain.

Adverse Reactions: CNS: Clouded sensorium, dizziness, euphoria, lightheadedness, physical dependence, sedation, somnolence
CV: Bradycardia, hypotension
GI: Constipation, nausea, vomiting, ileus
GU: Urine retention
Respiratory: Respiratory depression
Skin: Diaphoresis, pruritus

Dosages: 5 mg orally every 6 hours or one suppository rectally 3 or 4 times per day as needed. Patients not currently receiving Opioids, who need a continuous, around the clock analgesic for an extended period of time, give 10 mg controlled release tablet orally every 12 hours. May increase dose every 1 - 2 days as needed. The 80 mg formulation is for opioid tolerant patients only. Available forms are: capsules in 5 mg; oral solution is in 5 mg/ml and 20 mg/ml; suppository is in 10 mg and 20 mg; tablets (immediate release) is in 5 mg, 15 mg, and 30 mg; tablets (controlled release) is in 10 mg, 20 mg, 40 mg, and 80 mg; and Oxycodone pectinate suppositories are in 30 mg. The oral route has an onset of 10 - 15 minutes with a peak of 1 hour and a duration of 3 - 6 hours.

Nursing Considerations: Anticoagulants, Oxycodone (Percoset - narcotic - pain) products containing Aspirin (ASA) may increase anticoagulant effects. Monitor clotting times. Use together cautiously.
-CNS (central nervous system) Depressants, General Anesthetics, Hypnotics, MAO (Monoamine Oxidase) Inhibitors, other Opioid Analgesics, Sedatives, Tranquilizers, Tricyclic Antidepressants may cause additive effects. Use together with caution. Reduce Oxycodone (Percoset - narcotic - pain) dose, and monitor patient response.
-Alcohol use may cause additive effects. Discourage use together.
- May increase amylase and lipase levels.
- Contraindicated in patients hypersensitive to drug.
- Contraindicated in those suspected of having paralytic ileus.
- Use with caution in elderly and debilitated patients and in those with Head Injury, Increased Intracranial Pressure, Seizures, Asthma, COPD (Chronic Obstructive Pulmonary Disease), Prostatic Hyperplasia, Severe Hepatic and Renal Disease, Acute Abdominal Conditions, Urethral Stricture, Hypothyroidism, Addison Disease, and Arrhythmias.
- Reassess patient’s level of pain at least 15 and 30 minutes after administration.
- For full analgesic effect, give drug before patient has intense pain.
- To minimize GI (gastrointestinal) upset, give drug after meals or with milk.
- Single drug Oxycodone (Percoset – narcotic – pain) solution or tablets are especially useful for patients who should not take Aspirin (ASA) or Acetaminophen (Tylenol).
- Monitor circulatory and respiratory status. Withhold dose and notify Physician if respirations are shallow or if respiratory rate falls below 12 breaths/minute.
- Monitor patient’s bladder and bowel pattern. Patient may need a laxative because drug has a constipating effect.
- Reserve the 80 mg controlled release tablets for opioid-tolerant patients who are taking daily doses of 160 mg or more.
- Patients taking the controlled release form around the clock may need to take the immediate release form for pain exacerbation or for prevention of incident pain.
- For patients who are taking more than 60 mg daily, stop drug gradually to prevent withdrawal symptoms.
- OxyContin (Percoset – narcontin – pain) is not intended for as needed use or for immediate post operative pain. Drug is indicated only for postoperative use if patient was receiving it before surgery or if pain is expected to persist for an extended time.
- OxyContin (Percoset – narcontin – pain) is potentially addictive and abused as much as Morphine (narcotin – pain). Chewing, crushing, snorting, or injecting it can lead to overdose and death.
- Instruct patient to take drug before pain is intense.
- Tell patient to take drug with milk or after eating.
- Tell patient to swallow extended release tablets whole.
- Caution ambulatory patient about getting out of bed or walking.
- Warn outpatient to avoid driving and other hazardous activities that require mental alertness until drug’s CNS (central nervous system) effects are known.
- Advise patient to avoid alcohol use during therapy.
- Tell patient not to stop drug abruptly.
PROPOFOL/DIPRIVAN  
(Central Nervous System Drug)

Indication: To induce anesthesia, to maintain anesthesia, monitored anesthesia care, and to sedate intubated intensive care unit patients (ICU)


Adverse Reactions: CNS: Movement  
CV: Bradycardia, hypotension, hypertension, decreased cardiac output  
Metabolic: Hyperlipidemia  
Respiratory: Apnea, respiratory acidosis  
Skin: Rash  
Other: Burning or stinging at injection site

Dosages: To maintain anesthesia: adults - 0.1 mg to 0.2 mg/kg/min (6 mg to 12 mg/kg/hour), or give in 20 mg or 50 mg intermittent boluses as needed. In healthy children ages 2 months to 16 years, 125 minute - 300 mcg/kg/minute (7.5 mg/kg/hour to 18 mcg/kg/hour). Available forms injection 10 mg/ml in 20 ml ampules, 50 ml prefilled syringes, 50 ml and 100 ml infusion vials. The onset IV is less than 40 seconds and the duration is 10 - 15 minutes.

Nursing Considerations: Maintain strict aseptic technique when handling the solution. Drug can support the growth of microorganisms; do not use if solution might be contaminated.
- Allow an adequate time interval - 3 to 5 minutes, between dosage adjustments to assess effects.
- Protect drug from light. Shake well. Dilute only with D5W. Do not dilute to less than 2 mg/ml. Do not infuse through a filter with a pore size smaller than 5 microns. Give via larger veins in arms to decrease injection site pain.
- Do not mix drug with other therapeutic drugs before injection.
- Do not give drug in same IV line as blood or plasma. Discard tubing and unused portions of drug after 12 hours.
- Do not use if phases of emulsion show evidence of separation.
- Inhaled anesthetics (such as Enflurane, Halothane, Isoflurane), Opioids (Alfentanil (potent short acting synthetic opioid analgesic), Fentanyl (anesthetic - pain), Meperidine (Demerol -
narcotic - pain), Morphine – narcotic - pain), Sedatives (such as Barbiturates, Benzodiazepines, Chloral Hydrate (sleeping medication), Droperidol (Inapsine – anesthetic) may increase anesthetic and sedative effects may further decrease blood pressure and cardiac output. Monitor patient closely. -St. John's Wort (herb) may prolong anesthetic effects. Advise patient to stop using herbs, 5 days before surgery. -May increase lipid levels. -Contraindicated in patients hypersensitive to drug or its components (including egg, lecithin, soybean oil, and glycerol) and in those unable to undergo general anesthesia or sedation. -Use cautiously in patients who are hemodynamically unstable or who have seizures, disorders of lipid metabolism, or increased intracranial pressure. -Urine may turn green if drug is used for prolonged sedation in ICU (intensive care unit). -Titrate drug daily to maintain minimum effective level. -For general staff or monitored anesthesia care sedation, trained staff not involved in the surgical or diagnostic procedure should give drug. For ICU (intensive care unit) sedation, persons skilled in managing critically ill patients and trained in cardiopulmonary resuscitation and airway management should give drug. -Continuously monitor vital signs. -Monitor patient at risk for hyperlipidemia or for elevated triglyceride levels. -Drug contains 0.1 g of fat (1.1 kcal)/ml. Reduce other lipid products if given together. -Drug contains Ethylenediamine (Tetraacetic acid, a strong metal chelator). Consider supplemental Zinc during prolonged therapy. -When giving drug in the ICU (intensive care unit), assess patient’s CNS (central nervous system) function daily to determine minimum dose needed. -Stop drug gradually to prevent abrupt awakening and increased agitation. -Do not confuse Diprivan (Propofol – anesthetic for ICU patients) with Dipivefrin (to treat glaucoma).
- Advise patient that performance of activities requiring mental alertness may be impaired for some time after drug use.
ULTRAM/TRAMADOL HYDROCHLORIDE
(Analgesics)

Indication: Moderate to moderately severe pain

Action: Unknown. A centrally acting synthetic analgesic compound not chemically related to opioids. Thought to bind to Opioid receptors and inhibit reuptake of Norepinephrine and Serotonin.

Adverse Reactions: CNS: Dizziness, headache, somnolence, vertigo, seizures, anxiety, asthenia, CNS (central nervous system) stimulation, confusion, coordination disturbance, euphoria, malaise, nervousness, sleep disorder
CV: Vasodilitation
EENT: Visual disturbances
GI: Constipation, nausea, vomiting, abdominal pain, anorexia, diarrhea, dry mouth, dyspepsia, flatulence
GU: Menopausal symptoms, proteinuria, urinary frequency, urine retention
Musculoskeletal: Hypertonia
Respiratory: Respiratory depression
Skin: Diaphoresis, pruritus, rash

Dosages: Initially 25 mg orally in the morning. Adjust by 25 mg every 3 days to 100 mg/day (25 mg four times a day). Thereafter, adjust by 50 mg every 3 days to reach 200 mg/day (50 mg four times a day). Thereafter, give 50 to 100 mg orally every 4 to 6 hours as needed. Maximum 400 mg daily for adults only. No reference is made for children. Elderly patients older than 75, maximum is 300 mg daily in divided doses. Available forms is in 50 mg tablets only. Peak time is 2 hours.

Nursing Considerations: Carbamazepine (Tegretol - anticonvulsant) may increase Ultram (pain) metabolism. Patients receiving long term Carbamazepine (Tegretol - anticonvulsant) therapy up to 800 mg daily may need up to twice the recommended Ultram (pain) dose. CNS (central nervous system) Depressants may cause additive effects. Use together cautiously; Ultram (pain) dosage may need to be reduced.
-Cyclobenzaprine (Flexeril - skeletal muscle relaxant), MAO (Monoamine Oxidase) Inhibitors, Neuroleptics, other opioids, Tricyclic Antidepressants may increase risk of seizures.
Monitor patient closely.
- May increase liver enzyme level. May decrease creatinine and hemoglobin levels.
- Contraindicated in patients hypersensitive to drug or other Opioids, and in those with acute intoxication from alcohol, Hynotics, Centrally Acting Analgesics, Opioids, or Psychotropic Drugs. Serious hypersensitivity reactions can occur, usually after the first dose. Patients with history of anaphylactic reaction to Codeine (narcotic - pain) and other Opioids may be at increased risk.
- Use cautiously in patients at risk for seizures or respiratory depression; in patients with Increased Intracranial Pressure or Head Injury, Acute Abdominal Conditions, or Renal or Hepatic Impairment, or in patients with physical dependence on Opioids.
- Reassess patient's level of pain at least 30 minutes after administration.
- Monitor CV (cardiovascular) and respiratory status. Withhold dose and notify Physician if respirations decrease or rate is below 12 breaths/minute.
- Monitor bowel and bladder function. Anticipate need for laxative.
- For better analgesic effect, give drug before onset of intense pain.
- Monitor patients at risk for seizures. Drug may reduce seizure threshold.
- In the case of an overdose, Naloxone (Narcan - reverse side effects of narcotic) may also increase risk of seizures.
- Monitor patient for drug dependence. Drug can produce dependence similar to that of Codeine (narcotic - pain or Dextropropoxyphene (Darvon - pain) and thus has potential for abuse.
- Withdrawal symptoms may occur if drug is stopped abruptly. Reduce dosage gradually.
- Do not confuse Tramadol (Ultram - pain) with Trazodone (Desyrel - antidepressant) or Trandolapril (Mavik - antihypertensive).
- Tell patient to take drug as prescribed and not to increase dose or dosage interval unless ordered by Physician.
-Caution ambulatory patient to be careful when rising and walking. Warn outpatient to avoid driving and other potentially hazardous activities that require mental alertness until drug's CNS (central nervous system) effects are known.
-Advise patient to check with Physician before taking OTC (over the counter) drugs because drug interactions can occur.
-Warn patient not to stop the drug abruptly.
SEDATIVES AND HYPNOTICS

Because of the high risk of Barbiturate toxicity and dependence, many Physicians no longer regard Barbiturates as the drugs of choice for sedation and are using Benzodiazepines.

Major Uses
Sedatives and Hypnotics are used to treat insomnia, induce sleep before operative or test procedures, and provide sedation and relief of anxiety.

Mechanism of Action
Although their mechanism of action is not completely defined, Barbiturates probably interfere with transmission of impulses from the thalamus to the cortex of the brain. Dalmane, for example, acts on the limbic system, thalamus, and hypothalamus of the central nervous system to produce hypnotic effects.

Absorption, Distribution, Metabolism and Excretion
The barbiturates are well absorbed from all administration routes; the sodium salts are more rapidly absorbed than the acids. They are distributed to all tissues and body fluids, with high concentrations in the brain and liver. They are metabolized slowly in the liver. Both metabolites and unchanged drug are excreted in urine. Trace amounts are also eliminated in feces and perspiration.

Onset and Duration
The Sedatives and Hypnotics have a wide range as to onset and duration from ultra short acting, short acting, intermediate acting to long acting. Duration is as short as 1 hour to 6 hours or more. So make sure you read the literature on the drug the Physician has prescribed for you or your child.
AMBIEN/ZOLPIDEM TARTRATE
(Sedative-Hypnotic)

Indication: Short term management of insomnia

Action: Although drug interacts with one of three identified gamma aminobutyric acid (GABA), Benzodiazepine receptor complexes, it is not a Benzodiazepine. It exhibits hypnotic activity and minimal muscle relaxant and anticonvulsant properties

Adverse Reactions: CNS: Headache, amnesia, change in dreams, daytime drowsiness, depression, dizziness, hangover, lethargy, light headedness, nervousness, sleep disorder
CV: Palpitations
EENT: Pharyngitis, sinusitis
GI: Abdominal pain, constipation, diarrhea, dry mouth, dyspepsia, nausea, vomiting
Musculoskeletal: Arthralgia, myalgia
Skin: Rash
Other: Back or chest pain, flulike syndrome, hypersensitivity reactions

Dosages: 10 mg (immediate release) or 12.5 mg (extended release) oral immediately before bedtime. Elderly patients 5 mg (immediate release) or 6.25 mg (extended release) oral immediately before bedtime. Maximum daily dose is 10 mg (immediate release) or 6.25 mg (extended release). Available forms are tablets – 5 mg and 10 mg; tablets (extended release) 6.25 mg and 12.5 mg. The oral route has a rapid onset with a peak of between 30 and 120 minutes.

Nursing Considerations: CNS (central nervous system) Depressants may cause excessive CNS (central nervous system) depression. Use together cautiously.
-Rifampin (antitubercular) may decrease effects of Ambien (sedative). Avoid using together, if possible. Consider alternative hypnotic.
-Alcohol use may cause excessive CNS (central nervous system) depression. Discourage use together.
-No known contraindications.
-Use cautiously in patients with compromised respiratory status.
-Use drug only for short term management of insomnia, usually
7 to 10 days.
- Use the smallest effective dose in all patients.
- Take precautions to prevent hoarding by patients who are depressed, suicidal, or drug dependent, or who have a history of drug abuse.
- Do not confuse Ambien (sedative) with Amen (Depo Provera).
- Do not crush or divide extended release tablets.
- For rapid sleep onset, instruct patient not to take drug with or immediately after meals.
- Instruct patient to take drug immediately before going to bed; onset of action is rapid.
- Tell patient to avoid alcohol use while taking drug.
- Tell patient not to crush, chew, or divide the extended release tablets.
- Caution patients to avoid performing activities that require mental alertness or physical coordination during therapy.
**CHLORAL HYDRATE**
(Sedative/Hypnotics)

**Indication:** Sedation, insomnia, preoperatively to produce sedation and relieve anxiety and premedication for EEG

**Action:** Unknown: Sedative effects may be caused by drug's main metabolite, trichloroethanol

**Adverse Reactions:**
- CNS: Drowsiness, nightmares, dizziness, ataxia, paradoxical excitement, hangover, somnolence, disorientation, delirium, light headedness, hallucinations, confusion, somnambulism (someone who sleepwalks), vertigo, malaise, physical and psychological dependence
- GI: Nausea, vomiting, diarrhea, flatulence
- Hematologic: Eosinophilia, leukopenia
- Other: Hypersensitivity reactions

**Dosages:**
- 8 mg/kg orally three times a day, maximum dosage is 500 mg three times a day for children; for insomnia, 50 mg/kg oral or rectal 15 to 30 minutes before bedtime. Maximum single dose is 1000 mg for children. For adults for sedation, 250 mg orally or rectal three times a day after meals. Maximum single or daily dose is 2000 mg; for insomnia 500 mg to 1000 mg oral or rectal 15 to 30 minutes before bedtime. Maximum daily dose is 2000 mg. Each indication may vary in dosages. Available forms are: capsules 250 mg and 500 mg; suppositories 324 mg, 500 mg, and 648 mg; syrup 250 mg/5ml and 500mg/5 ml. Oral onset is 30 minutes with a duration of 4 - 8 hours. The rectal route also has a duration of 4 - 8 hours.

**Nursing Considerations:**
- CNS (central nervous system) Depressants including Opioid Analgesics may cause excessive CNS (central nervous system) depression or vasodilation reaction. Use together cautiously.
- Lasix IV (diuretic) may cause sweating, flushes, variable blood pressure, nausea, and uneasiness. Use together cautiously or use a different hypnotic drug.
- Oral Anticoagulants may increase risk of bleeding. Monitor patient closely.
- Phenytoin (Dilantin - anticonvulsant) may decrease Phenytoin (anticonvulsant) level. Monitor
patient closely.
-Alcohol use may react synergistically, increasing CNS (central nervous system) depression, or rarely may produce a Disulfiram-like reaction (an antabuse poisoning). Strongly discourage alcohol use with these drugs.
-May increase eosinophil count. May increase WBC count.
-May cause false positive results in urine glucose tests that use cupric sulfate, such as Benedict reagent, and in phentolamine tests.
-Contraindicated in patients hypersensitive to drug and in those with hepatic or renal impairment.
-Oral administration is contraindicated in patients with gastric disorders.
-Use with caution in patients with severe cardiac disease.
-Use cautiously in patients with mental depression, suicidal tendencies, or history of drug abuse.
-Some products may contain Tartrazine (a yellow dye in food coloring), use cautiously in patients with Aspirin (ASA) sensitivity.
-Note two strengths of oral liquid form. Double check dose, especially when giving to children. Fatal overdoses have occurred.
-To minimize unpleasant taste and stomach irritation, dilute or give with liquid. Tell patient to take drug after meals.
-Take precautions to prevent hoarding or overdosing by patients who are depressed, suicidal, or drug dependent or who have history of drug abuse.
-Long term use is not recommended; drug loses its effectiveness in promoting sleep after 14 days of continued use. Long term use may cause drug dependence, and patient may experience withdrawal symptoms if drug is suddenly stopped.
-Monitor BUN level, large doses may raise BUN level.
-Do not give drug for 48 hours before fluorometric test.
-Instruct patient to take capsule with a full glass of water or juice and to swallow capsule whole.
-Tell patient to avoid alcohol during drug therapy.
-Caution patient to avoid performing activities that require mental alertness or physical coordination.
- Advise patient to store drug in dark container and store suppositories in refrigerator.
DALMANE/FLURAZEPAM HYDROCHLORIDE
(Sedative-Hypnotic)

Indication: Insomnia

Action: A Benzodiazepine that is thought to act on the limbic system, thalamus, and hypothalamus of CNS (central nervous system) to produce hypnotic effects

Adverse Reactions: CNS: Daytime sedation, dizziness, drowsiness, disturbed coordination, lethargy, confusion, physical or psychological dependence, headache, light headedness, nervousness, hallucinations, staggering, ataxia, disorientation, coma
GI: Nausea, vomiting, heartburn, diarrhea, abdominal pain

Dosages: 15 mg to 30 mg oral at bedtime. May repeat dose once as needed. Elderly patients. 15 mg oral at bedtime initially, until response is determined. Available in capsules of 15 mg and 30 mg. Oral route has an onset in 15 to 45 minutes, peaks in 30 to 60 minutes and has a duration of 7 to 8 hours.

Nursing Considerations: Cimetadine (Tagamet - stomach) may increase sedation. Monitor patient carefully.
-CNS (central nervous system) Depressants, including Opioid Analgesics may cause excessive CNS (central nervous system) depression. Use together cautiously.
-Digoxin (heart) may increase Digoxin (heart) level, resulting in toxicity. Monitor patient closely.
-Disulfram (antabuse poisoning), hormonal contraceptives, Isoniazid (antitubucular) may decrease metabolism of Benzodiazepines, leading to toxicity. Monitor patient closely.
-Fluconazole (Diflucan - antifungal), Itraconazole (Sporanox - antifungal), Ketoconazole (Nizoral - antifungal), Miconazole (Monistat - antifungal) may increase and prolong drug level, CNS (central nervous system) depression, and psychomotor impairment. Avoid using together.
-Phenytoin (Dilantin - anticonvulsant) may increase Phenytoin (Dilantin - anticonvulsant) level. Watch for toxicity.
-Rifampin (antitubucular) may enhance metabolism of Benzodiazepines. Watch for decreased effectiveness of Benzodiazepines.
-Theophylline (bronchospasm) may act as an antagonist with
Dalmane (sedative). Watch for decreased effectiveness of Dalmane (sedative).
- Calendula, hops, kava, lemon balm, passion flower, skullcap, valerian (all herbs) may enhance sedative effect of drug. Discourage use together.
- Alcohol use may cause additive CNS (central nervous system) effects. Discourage use together.
- Smoking may increase metabolism and clearance and decrease drug half life. Advise patient to watch for signs of decreased effects.
- Use cautiously in elderly patients and in those with impaired hepatic and renal function, chronic pulmonary insufficiency, mental depression, suicidal tendencies, or history of drug abuse.
- Check hepatic and renal function and CBC before and periodically during longterm therapy.
- Minor changes in EEG patterns (usually low voltage, fast activity) may occur during and after therapy.
- Assess mental status before starting. Elderly patients are more sensitive to drug's adverse CNS (central nervous system) reactions.
- Take precautions to prevent hoarding or self overdosing by depressed, suicidal, or drug dependent patients and those with history of drug abuse.
- Patient may become physically and psychologically dependent with long term use.
- Do not confuse Dalmane (sedative) with Demulen (hormonal contraceptive).
- Inform patient that drug is more effective on second, third, and fourth night of treatment because drug builds up in the body.
- Warn patient not to abruptly stop drug after taking it for 1 month or longer.
- Tell patient to avoid alcohol use while taking drug.
- Caution patient to avoid performing activities that require mental alertness or physical coordination.
- Warn patient that prolonged use of this drug may produce psychological and physical dependence.
HALCION/TRIAZOLAM
(Sedative-Hypnotic)

Indication: Insomnia

Action: Unknown. A Benzodiazepine that probably acts on the limbic system, thalamus, and hypothalamus of the CNS (central nervous system) to produce hypnotic effects

Adverse Reactions: CNS: Drowsiness, amnesia, ataxia, depression, dizziness, headache, lack of coordination, mental confusion, nervousness, physical or psychological dependence, rebound insomnia
GI: Nausea, vomiting

Dosages: 0.125 mg to 0.5 mg orally at bedtime. Elderly or debilitated patients 0.125 mg orally at bedtime; increased as needed to 0.25 mg orally at bedtime. Available forms: tablets 0.125 mg and 0.25 mg. The peak time is 1 - 2 hours and the duration is 1½ to 5½ hour.

Nursing Considerations: Cimetidine (Tagamet - stomach), Erythromycin (antibiotic), Fluoxetine (Prozac - antidepressant), Fluvoxamine (Luvox - anticonvulsant), Isoniazid (antitubercular), Nefazodone (Serzone, antidepressant, be cautious of for Batten children), and Ranitidine (Zantac - stomach) may increase Halcion (sedative) level. Avoid using with azole antifungals or Nefazodone (Serzone - antidepressant). Watch for increased sedation if used with other drugs.
-CNS (central nervous system) Depressants may cause excessive CNS (central nervous system) depression. Use together cautiously,
-Diltiazem (Cardiazem - heart) may increase CNS (central nervous system) depression and prolonged effects of Halcion (sedation). Reduce Halcion (sedation) dose.
-Fluconazole (Diflucan), Itraconazole (Sporonox), Ketoconazole (Nizoral), and Miconazole (Monistat) all antifungals, may increase and prolong drug CNS (central nervous system) depression, and psychomotor impairment. Avoid using together.
-Calendula, hops, kava, lemon balm, passion flower, skullcap, valerian, all herbs, may enhance sedative effect of drug. Discourage use together.
-Grapefruit may delay onset and increase drug effects.
Discourage use together.
- Alcohol use may cause additive CNS (central nervous system) effects. Discourage use together.
- Smoking may increase metabolism and clearance of drug. Advise patient who smokes to watch for decreased effectiveness of drug.
- May increase liver function test values.
- Contraindicated in those hypersensitive to Benzodiazepines.
- Use cautiously in patients with Impaired Hepatic or Renal Function, Chronic Pulmonary Insufficiency, Sleep Apnea, Mental Depression, Suicidal Tendencies, or history of Drug Abuse.
- Assess mental status before starting therapy and reduce doses in elderly patients; these patients may be more sensitive to drug’s adverse CNS (central nervous system) effects.
- Monitor CBC, chemistry, and urinalysis.
- Take precautions to prevent hoarding or overdosing by patients who are depressed, suicidal, or drug dependent or who have history of drug abuse.
- Minor changes in EEG patterns (usually low voltage fast activity) may occur during and after therapy.
- Do not confuse Halcion (sedative) with Haldol (antipsychotic) or Halcinonide (topical ointment used for inflammation from Corticosteroids).
- Warn patient not to take more than prescribed amount; overdose can occur at total dose of 2 mg (or four times highest recommended amount).
- Tell patient to avoid alcohol use while taking drug.
- Warn patient not to stop drug abruptly after taking for 2 weeks or longer.
- Caution patient to avoid performing activities that require mental alertness or physical coordination.
- Inform patient that drug does not tend to cause morning drowsiness.
- Tell patient that rebound insomnia may occur for 1 to 2 nights after stopping therapy.
MELATONIN

The hormone Melatonin is now a popular therapy for jetlag and disturbances of sleep. Claims are made for longevity and even lowering of blood pressure. Melatonin is not licensed for sale in pharmacies in the UK at the present time, but can be bought over the counter in health food shops. Recent newspaper reports suggest that the Medicines Control Agency has written to the suppliers of the synthetic hormone to tell them that in future it will only be available on prescription. A survey of the medical literature reveals investigations are being done by many workers to determine the efficacy and side effects of the use of Melatonin in a number of conditions. The main focus of attention is on sleep disturbances, seasonal affective disorder, neuroendocrine disorder and cancer therapy. It is not recommended that Melatonin should be taken unless prescribed by a qualified medical practitioner and according to the Drug Enforcement laws of the country in which it is taken.

What is Melatonin? Melatonin is a hormone produced especially at night in the pineal gland. Its secretion is stimulated by the dark and inhibited by light. Tryptophan is converted to Serotonin and finally converted to Melatonin, which is an Indole. The suprachiasmatic nuclei of the hypothalamus have Melatonin receptors and Melatonin may have a direct action on the nuclei to influence "circadian" rhythms.

Jet Lag and Sleep Disturbances Jetlag is the result of long distance travel east/west crossing time zones at a rapid rate. Symptoms such as sleep disturbance, loss of appetite, reduced psychomotor efficiency and general malaise may occur. The problem for aircrews on long haul schedules has been coped with by alterations in sleep patterns. Short naps may alternate with intermediate and long periods of sleep. Synchronizers (time givers) are environmental factors that help to keep the organism in phase. Travel at rapid rates across time zones disturbs the normal rhythm. One adapts more easily after a flight west, because there is a longer day and we have an endogenous clock of about 25 hours. Circadian rhythms need about one day to adapt for each time zone crossed. In other words 5 hours time difference will require approximately 5 days adaptation.

The CAA in the UK, do not appear to have guidelines for the management of jetlag in pilots, which include the use of Melatonin. The current recommendation is for pilots having sleep disturbance to take a Benzodiazepine such as Temazepam. A
combination of treatment including light, Melatonin and Diazepam may be needed. There was also a significantly faster recovery of energy and alertness. No "hangover" effects were noted as assessed by mood and performance tests administered the morning after treatment. Most of the children were neurologically multiply disabled. All had failed to respond to conventional management. There were no adverse side effects and behavioral and social benefits were significant. The authors concluded that Melatonin has an important role in the treatment of certain types of chronic sleep disorders.

Melatonin as an antioxidant. Melatonin is a highly important antioxidant. Free radicals are chemical constituents that have an unpaired electron. If an electron is added to O2 then the superoxide anion radical O2 is formed. O2 is reduced by superoxide dismutase to H2O2, which is toxic at high concentrations and then can be reduced to OH. The hydroxyl radical (OH) damages cells. Melatonin is an efficient neutralizer of OH. Age related brain deterioration is extremely costly in terms of quality of life. One of the potential major causes of age related destruction of neuronal tissue is toxic free radical that are a natural result of aerobic metabolism. The brain is particularly susceptible to free radical attack, vitamin antioxidants, vitamin E and vitamin C aid in protecting the brain from oxidative stress by directly scavenging toxic radicals. The pineal hormone, Melatonin, is rapidly taken up by the brain.

Melatonin and Cancer Electromagnetic fields (EMF) have been linked to tumors. If the pineal gland is removed in rats the incidence of tumors is increased. EMFs may influence Melatonin production in the pineal gland. Gliomas have been linked to EMFs. Inhibition of cancer growth by Melatonin has been observed. Melatonin is most effective when given in the evening. There are data, which indicate that Melatonin antagonizes the mitogenic effects of estrogens. As stated above Melatonin has been found to be the most effective scavenger of highly toxic free radicals, which induce DNA damage (tumors).

Melatonin and Depressive Disorders Seasonal Affective Disorder (SAD), a depression occurring in the winter months and associated with hypersomnia, weight gain and craving for carbohydrates has been found to improve with bright light treatment. The benefit appeared to be related to light rather than Melatonin inhibition as these workers found that pharmacological suppression of Melatonin did not improve their depression. Changes in magnetic fields alter Melatonin secretion and affect circadian rhythms. Environmental magnetic fields (MF) have
diminished strength during the winter months and there may be desynchronization of circadian rhythm. Both acute exposure to light and exposure to magnetic fields suppress Melatonin secretion and may be beneficial for patients with winter depression. It has been proposed that the synergistic effect of light and magnetic therapy in these patients may be superior to photo therapy alone. Low Melatonin levels have been observed in depressed subjects, unipolar or bipolar affective disorders, and chronic schizophrenia. Low nocturnal Melatonin has been proposed as a trait marker for major depressive disorders. Therapy with Monoamine Oxidase Inhibitors (MAO) increases pineal content of Serotonin (Melatonin precursor); Tricyclic Antidepressants reduce Melatonin production and secretion in rodents. Other psychotropic drugs, which interfere with monoamine pathways, also affect pineal Melatonin. Melatonin has been proposed to inhibit CRH (corticotrophin release hormone) during major depression. Receptors for Benzodiazepines have been reported to exist in the pineal gland of several animal species. In humans, Alprazolam (Xanax) given before lights out suppressed nocturnal Melatonin and Cortisol. The conventional view that the underlying abnormality in endogenous depression is due to an abnormality in the body clock has been challenged. They suggest that the circadian system in endogenous depression resembles its state in healthy individuals after time zone transitions or in shift work maladaptation syndrome and disturbances result from changes in the phasing of external time givers rather than from an abnormality in the clock itself.

Melatonin and Endocrine Disorders External magnetic fields have been found to synchronize Melatonin secretion in experimental animals and humans and may be beneficial in the treatment of postmenopausal osteoporosis. Pineal Melatonin has been shown in animals to be involved in the regulation of calcium and phosphorus metabolism by stimulating the parathyroid glands and by inhibiting calcitonin release and prostaglandin synthesis. The menopause is associated with a decline in Melatonin secretion and increased pineal calcification. The pineal gland has been linked to the immune system and immunodepression has been counteracted by Melatonin administration. The thymus is one of the main targets of Melatonin and its immunoenhancing effects may be mediated by opioids derived from T helper cells, lymphokines and possibly pituitary hormones. Lymphokines, such as gamma-interferon and L2, as well as thymic hormones can modulate the synthesis of Melatonin in the pineal gland. A relation between the pineal and puberty has been speculated for many years. Normal pubertal development does not appear to be linked to alterations in Melatonin profile. However, there is some evidence that
delayed puberty, precocious puberty and hypothalamic amenorrhoea may have altered Melatonin profiles.

Melatonin and Adverse Effects Controlled release Melatonin effectively improved sleep quality in 12 elderly people. The subjects were treated with 2 mg per night for 3 weeks, 2 cases developed pruritis, one on Melatonin and one on placebo. Both resolved spontaneously. Advanced tumors of the digestive tract were treated with IL-2 and Melatonin. (colo rectal cancer 14, gastric cancer 8, Hepato carcinoma 6, Pancreatic adenoca 7). Toxicity was low in all patients who received the therapy at home, 22 patients with advanced renal cell carcinoma were treated for 12 months with human lymphoblastoid interferon (IFN) and Melatonin 10mgs per day. General toxicity was mild. Fevers, chills, arthralgias and myalgias occurred rarely. Leukopenia and hepatic enzyme elevation were modest and always reversible. Melatonin was combined with a synthetic progestin norethisterone to study its influence on the pituitary ovarian axis. An additive or synergistic effect between Melatonin and norethisterone was suggested. Medications did not alter sleep/wake rhythms and were not complicated by any side effects. 3 mg of Melatonin daily (days 1 - 30) caused significantly decreased mean levels of LH compared to 8 nonmedicated controls. Present data suggest that Melatonin and mel/net combinations inhibit ovarian function in women and the authors suggest a future effective oral contraceptive. A study was done in 1972 to assess the effects of Melatonin in Parkinsonism giving Melatonin alone or plus Levadopa. Melatonin induced some episodes of cutaneous flushing, abdominal cramps, diarrhoea, scotoma lucidum and migraine headaches, 300-1000mgs/night were given for 1 - 4 weeks. Effects of Metoprolol and Atenolol on plasma Melatonin levels revealed lower plasma Melatonin levels in moderate hypertensives receiving betablockers than in those on diuretics alone or in combination.

General comments Once Melatonin is on prescription, it will be possible to document side effects more accurately. A major side effect appears to be fatigue, which is understandable given that one is resetting the "body clock". Melatonin will almost certainly have a role in the treatment of jetlag and sleep disorder syndromes but the exact dose regime still requires to be worked out, as there appears to be a variable in the recommendations. Some studies suggest taking Melatonin 3 days prior to departure and others on arrival. Some recommend taking it at 2pm the day before traveling. Others again recommend taking it in the early AM when traveling west and in the PM when traveling east. The problem with
getting it wrong is you may actually make the jetlag worse. Some studies have been done using very large doses and these have produced adverse effects.

Melatonin as sold at the present time is not a pure pineal extract and is therefore regarded by some workers to be impure. One format contains Melatonin, herbs such as valerian and chamomile, together with amino acids, calcium and magnesium. There appears to be some consensus about its efficacy as an adjuvant therapy in advanced cancer, especially when used with Interleukin 2. There may therefore be some justification for taking it in these conditions under strict medical supervision. Anti aging claims will require detailed investigation and are difficult to measure given the vast differences in memory recall and physical fitness that exist between individuals.

The use of Melatonin in psychiatric patients is under investigation and some guidelines may be forthcoming given that there are pineal receptors to Benzodiazepines and that there appears to be suppression of Melatonin secretion by Alprazolam (Xanax - antianxiety) a Benzodiazepine Suppression of Melatonin by exposure to bright light may alleviate symptoms in some cases and may be a helpful treatment for winter depression, but this remains unproven. It has been recommended that as Fluoxetine (Prozac - antidepressant) and Melatonin may interact (due to the effect on Serotonin secretion by Fluoxetine (Prozac - antidepressant) that they should not be taken at the same time. An alteration in Melatonin rhythm leading to altered sleep patterns requires further research and recommendations are needed as to how best to manipulate Melatonin secretion to affect these rhythms and benefit depressed patients.
NEMBUTAL/PENTOBARBITAL
(Sedative-Hypnotic)

Indication: Sedation, insomnia, and preoperative sedation

Action: May interfere with transmission of impulses from the thalamus to the cortex of the brain and alter cerebellar function.

Adverse Reactions: CNS: Drowsiness, lethargy, hangover, paradoxical excitement in elderly patients, somnolence, physical and psychological dependence
GI: Nausea, vomiting
Hematologic: Worsening porphyria
Respiratory: Respiratory depression
Skin: Rash, urticaria, Stevens Johnson's Syndrome
Other: Angioedema

Dosages: 2 mg to 6 mg/kg oral daily in three divided doses. Maximum daily dose is 100 mg for sedation in children; for insomnia in children, 2 mg to 6 mg/kg or 125 mg/ml IM. Maximum dose is 100 mg. Children ages 12 to 14: 60 mg or 120 mg rectally; Children ages 5 to 11: 60 mg rectally; Children 1 to 4: 30 mg or 60 mg rectally; Children ages 2 months to 1 year 30 mg rectally. For adults for sedation, 20 mg orally three or four times a day. For insomnia in adults, 100 mg to 200 mg orally at bedtime, or 150 mg to 200 mg deep IM, or 100 mg IV initially with further small doses up to total 500 mg or 120 mg or 200 mg rectally. Each indication may vary in dosages.

Available forms: Elixir 18.2 mg/5 ml; capsules 50mg and 100 mg; injection 50 mg/ml; suppositories 30 mg, 60 mg, 120 mg, and 200 mg. Oral route has an onset of 20 minutes, peak of 30 to 60 minutes and a duration of 1 to 4 hours; IV route has an onset of immediate, peak of immediate and a duration of 15 minutes; IM has an onset of 10 to 25 minutes; and rectal has an onset of 25 minutes and a duration of 1 to 4 hours.

Nursing Considerations: IV Barbiturates may cause severe respiratory depression, laryngospasm, or hypotension. Reserve their use for emergencies, under close supervision, with resuscitation equipment nearby.
To minimize deterioration, use injection solution within 30 minutes of opening container. Do not use cloudy solution.

Give slowly at no more than 50 mg/minute.

Do not mix in syringe or in solutions or lines with other drugs.

Parenteral solution is alkaline. Local tissue reactions and injection site pain may occur. Monitor site for extravasation. Assess patency of site before and during administration.

Incompatible with other IV drugs or solutions.

CNS (central nervous system) Depressants including Opioid Analgesics may cause excessive CNS (central nervous system) and respiratory depression. Use together cautiously.

Corticosteroids, Doxycycline (Vibramycin - antibiotic), Estrogens (hormones), and Hormonal Contraceptives, oral Anticoagulants, Theophylline (bronchospasm), and Verapamil (Calan - heart) may enhance metabolism of these drugs. Watch for decreased effect.

Griseofulvin (Grifulvin - antiinfective) may decrease absorption of Griseofulvin (Grifulvin - antiinfective). Monitor effectiveness of Griseofulvin (Grifulvin - antiinfective).

MAO (Monoamine Oxidase) Inhibitors, Valproic acid (Depakote - anticonvulsant), may inhibit metabolism of Barbiturates; may prolong CNS (central nervous system) depression. Reduce Barbiturates dosage.

Metoprolol (Lopressor - antihypertensive), Propranolol (Inderal - heart) may reduce effects of these drugs. May need to increase beta blocker dose.

Rifampin (antitubercular) may decrease barbiturate level. Watch for decreased effect of Nembutal (sedative).

Alcohol use may impair coordination, increase CNS (central nervous system) effects, and cause death. Strongly discourage alcohol use with these drugs.

Contraindicated in patients hypersensitive to Barbiturates and in those with Porphyria, Bronchopneumonia, or other Severe Pulmonary Insufficiency, and in Severe Liver or Renal Dysfunction.

Use cautiously in elderly or debilitated patients and in patients with acute or chronic pain, mental depression,
suicidal tendencies, history of drug abuse, or hepatic impairment.

- Assess mental status before starting therapy and reduce doses in elderly patients; these patients may be more sensitive to drug's adverse CNS (central nervous system) effects.

- Give deep IM injection with no more than 5 ml of drug at any one site. Superficial injection may cause pain, sterile abscess, and sloughing.

- To ensure accurate dosing, do not divide suppositories.

- Take precautions to prevent hoarding by patients who are Depressed, Suicidal, or Drug Dependent or who have a history of Drug Abuse.

- Watch for signs of Barbiturate Toxicity: coma, papillary constriction cyanosis, clammy skin, and Hypotension. Overdose can be fatal.

- Inspect patient's skin. Skin eruptions may precede fatal reactions. If skin reactions occur, stop drug and call Physician. In some patients, high temperature, stomatitis, headache, or rhinitis may precede skin reactions.

- Drug has no analgesic effect and may cause restlessness or delirium in patients with pain.

- Long term use for insomnia is not recommended; drug loses its effectiveness in promoting sleep after 14 days of continuous use. Long term high dosage may cause drug dependence, and patient may experience withdrawal symptoms if drug is suddenly stopped. Withdraw Barbiturates gradually.

- EEG patterns show a change in low voltage, fast activity; changes persist after therapy.

- Do not confuse Pentobarbital - (sedative) with Phenobarbital (anticonvulsant/sedative).

- Nembutal (sedative) may contain Tartrazine (yellow dye found in food coloring).

- Inform patient that morning hangover is common after hypnotic dose, which suppresses REM (rapid eye movement) sleep. Patient may experience increased dreaming after drug is stopped.

- Caution patient to avoid performing activities that require
mental alertness or physical coordination.
- Tell patient to avoid alcohol use while taking drug.
PROVIGIL/MODAFINIL
(Central nervous system stimulant)

Indication: To improve wakefulness in patients with excessive daytime sleepiness caused by narcolepsy, obstructive sleep apnea hypoapnea syndrome, and shift work sleep disorder

Action: Unknown. Similar to action of Sympathomimetics, including Amphetamines, but drug is structurally distinct from Amphetamines and does not alter release of Dopamine or Norepinephrine to produce CNS (central nervous system) stimulation.

Adverse Reactions: CNS: Headache, nervousness, dizziness, insomnia, fever, depression, anxiety, cataplexy, paresthesia, dyskinesia, hypertonia, confusion, syncope, amnesia, emotional lability, ataxia, tremor
CV: Arrhythmias, hypotension, hypertension, vasodilatation, chest pain
EENT: Rhinitis, pharyngitis, epistaxis, amblyopia, abnormal vision
GI: Nausea, diarrhea, dry mouth, anorexia, vomiting, mouth ulcer, gingivitis, thirst
GU: Abnormal urine, urine retention, albuminuria
Hematologic: Eosinophilia
Metabolic: Hyperglycemia
Musculoskeletal: Joint disorder, neck pain, neck rigidity
Respiratory: Asthma, dyspnea, lung disorder
Skin: Sweating
Other: Herpes Simplex, chills

Dosages: 200 mg daily as single dose in the morning. Patients with shift work sleep disorder should take dose about 1 hour before the start of their shift. In patients with severe hepatic impairment, give 100 mg daily as single dose in the morning.

Available from tablets - 100mg and 200 mg. Peak level is in 2 - 4 hours.

Nursing Considerations: Carbamazepine (Tegretol - anticonvulsant), Phenobarbital (anticonvulsant), Rifampin (antitubucular), and other inducers of CYP3A4 may alter Provigil (CNS - central nervous system stimulant) level. Monitor patient closely.
- Cyclosporine (Immuno - suppressant), Theophylline (bronchospasm) may reduce levels of these drugs. Use together cautiously.

- Diazepam (Valium - anticonvulsant/antianxiety), Phenytoin (Dilantin - anticonvulsant), Propranolol (Inderal - heart), other drugs metabolized by CYP2C19 may inhibit CYP2C19 and lead to higher levels of drugs metabolized by this enzyme. Use together cautiously; adjust dosage as needed.

- Itraconazole (Sporonox - antifungal), Ketoconazole (Nizoral - antifungal), other inhibitors of CYP3A4 may alter Provigil (CNS - central nervous system - stimulate) level. Monitor patient closely.

- Methyphenidate (Concerta/Ritalin - ADHD) may cause 1 hour delay in Provigil (CNS - central nervous system timulant) absorption. Separate dosage times.

- Phenytoin (Dilantin - anticonvulsant), Warfarin (Coumadin - blood thinner) may inhibit CYP2C9 and increase Phenytoin (Dilantin - anticonvulsant) and Warfarin (Coumadin - blood thinner) levels. Monitor patient closely for toxicity.

- Tricyclic Antidepressants (such as Clomipramine (Anafranil - antidepressant), Desipramine (Norpramin - antidepressant) may increase Tricyclic Antidepressant level. Reduce dosage of these drugs.

- May increase glucose, GGT, and AST levels.

- May increase eosinophil count.

- Contraindicated in patients hypersensitive to drug and in those with a history of left ventricular hypertrophy or ischemic EKG changes, chest pain, Arrhythmias, or other evidence of mitral valve prolapse linked to CNS (central nervous system) stimulant use.

- Use cautiously in patients with recent MI (myocardial infarction/heart attack) or unstable angina and in those with history of psychoses. Use cautiously and give reduced dosage to patients with severe hepatic impairment, with or without cirrhosis.

- Use cautiously in patients taking MAO (Monoamine Oxidase) Inhibitors.

- Safety and efficacy in patients with severe renal impairment
have not been determined.
- Monitor hypertensive patients closely.
- Although single dose of 400 mg has been well tolerated, the larger dose is no more beneficial than the 200 mg dose.
- Food has no effect on overall bioavailability but may delay absorption of drug by 1 hour.
- Instruct patient to confer with Physician before taking prescription or OTC (over the counter) drugs to avoid drug interactions.
- Tell patient to avoid alcohol while taking drug.
- Warn patient to avoid activities that require alertness or good coordination until CNS (central nervous system) effects of drug are known.
RESTORIL/TEMAZEPAM
(Sedative/Hypnotic)

Indication: Insomnia

Action: A Benzodiazepine that probably acts on the limbic system, thalamus, and hypothalamus of the CNS (central nervous system) to produce hypnotic effects

Adverse Reactions: CNS: Drowsiness, dizziness, lethargy, disturbed coordination, daytime sedation, confusion, nightmares, vertigo, euphoria, weakness, headache, fatigue, nervousness, anxiety, depression, minor changes in EEG patterns (usually low voltage fast activity).
EENT: Blurred vision
GI: Diarrhea, nausea, dry mouth
Other: Physical and psychological dependence

Dosages: 15 mg to 30 mg orally at bedtime, elderly or debilitated patients
-15 mg orally at bedtime until individualized response is determined. Available in 7.5 mg, 10 mg, 15 mg, 20 mg, and 30 mg. The peak time is in 1 to 2 hours and the duration is 3 to 18 hours.

Nursing Considerations: CNS (central nervous system) Depressants may increase CNS (central nervous system) depression. Use together cautiously.
- Calendula, hops, kava, lemon balm, passion flower, skullcap, valerian (herbs) may enhance sedative effect of drug. Discourage use together.
- Alcohol use may cause additive CNS (central nervous system) effects. Discourage use together.
- May increase liver function test values.
- Contraindicated in those hypersensitive to drug or other Benzodiazepines.
- Use cautiously in patients with Chronic Pulmonary Insufficiency, Impaired Hepatic or Renal Function, severe or latent Depression, Suicidal Tendencies, and history of Drug Abuse.
- In elderly patients, assess mental status before starting therapy, and reduces doses; these patients may be more sensitive to drug’s adverse CNS (central nervous system) effects.
- Take precautions to prevent hoarding by patients who are
depressed, suicidal, or drug-dependent or who have history of drug abuse.
- Do not confuse Restoril (sedative) with Vistaril (sedative/hypnotic).
- Tell patient to avoid alcohol during therapy.
- Caution patient to avoid performing activities that require mental alertness or physical coordination.
- Warn patient not to stop drug abruptly if taken for 1 month or longer.
- Tell patient that onset of drug's effects may take as long as 2 to 2\(\frac{1}{2}\) hours.
**ROZEREM/RAMELTEON**
*(Sedative-Hypnotic)*

**Indication:** Insomnia characterized by trouble falling asleep

**Action:** Acts on receptors believed to maintain the circadian rhythm underlying the normal sleep wake cycle

**Adverse Reactions:**
- **CNS:** Depression, dizziness, fatigue, headache, somnolence, worsened insomnia
- **GI:** Diarrhea, impaired taste, nausea
- **Musculoskeletal:** Arthralgia, myalgia
- **Respiratory:** Upper respiratory tract infection
- **Other:** Flulike symptoms

**Dosages:** 8 mg orally within 30 minutes bedtime. Do not give immediately after a high fat meal. Available only in a 8 mg capsule. Orally the onset is rapid with a peak of 30 - 90 minutes.

**Nursing Considerations:** CNS (central nervous system) Depressants may cause excessive CNS (central nervous system) depression. Use together cautiously.
- Fluconazole (strong CYP2C9 inhibitor, Diflucan), Ketoconazole (strong CYP3A4 inhibitor, Nizoral) all antifungals, weak CYP1A2 inhibitors may increase Rozerem (sedative/hypnotic level. Avoid using together.
- Rifampin (strong CYP enzyme inducer, antitubercular) may decrease Rozerem (sedative/hypnotic level. Monitor patient for lack of effect.
- Fluvoxamine (strong CYP1A2 inhibitor, Luvox - antidepressant), may increase Rozerem (sedative/hypnotic level. Avoid using together.
- Food (especially high fat meals) may delay time to peak drug effect. Tell patient to take drug on an empty stomach.
- Alcohol use may cause excessive CNS (central nervous system) depression. Discourage alcohol use.
- May increase prolactin level. May alter blood cortisol and testosterone levels.

- Contraindicated in those hypersensitive to drug or its components. Do not use in patients taking Fluvoxamine (Luvox) (antidepressant) or in those with severe hepatic impairment, severe sleep apnea, or severe COPD (Chronic Obstructive
Pulmonary Disease).
- Use cautiously in patients with depression or moderate hepatic impairment.
- Thoroughly evaluate the cause of insomnia before starting drug.
- Assess patient for behavioral or cognitive disorders.
- Drug does not cause physical dependence.
- Instruct patient to take dose within 30 minutes of bedtime.
- Tell patient not to take drug with or after a heavy meal.
- Caution against performing activities that require mental alertness or physical coordination after taking drug.
- Caution patient to avoid alcohol while taking drug.
- Tell patient to consult Physician if insomnia worsens or behavior changes.
VACCINES

**General Statement:** Vaccines have played an important role in the health and life span of our population. They have been in use for over 200 years, but since World War II, once the importance of disease prevention became evident, research into the area of vaccine development exploded.

Use of a vaccine (for actually contracting the disease) usually renders one temporary or permanent resistance to the infectious disease. Vaccines and toxoids promote the type of antibody production one would see if they had experienced the natural infection. This active immunization involves the direct administration of antigens to the host to cause them to produce the desired antibodies and cell mediated immunity. These agents may consist of live attenuated agents or killed (inactivated) agents, or agents that alter the hosts genetic structure. Immunizations confer resistance without actually producing disease.

Passive immunization occurs when immunologic agents are administered. Immunoglobulins and anti venins only after passive short vaccines and vitamins term immunity are usually administered for a specific exposure.

Aggressive pediatric immunization programs have helped reduce preventable diseases and death to children worldwide. This focus should continue and be expanded to the adult population. Many of whom have missed the natural infection and their past immunizations. A careful immunization history should be documented for every client, regardless of age. When in doubt, or if unknown if had infection or immunization, appropriate titers may be drawn. The following lists show some of the more common diseases, the general recommended schedule to confer immunization, and the length immunity conferred.
# COMMON DISEASES, GENERAL RECOMMENDED IMMUNIZATION SCHEDULE, AND LENGTH OF IMMUNITY

<table>
<thead>
<tr>
<th>DISEASE</th>
<th>IMMUNIZATION SCHEDULE</th>
<th>LENGTH OF IMMUNITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cholera</td>
<td>Two doses 1 week to 1 month apart</td>
<td>6 months</td>
</tr>
<tr>
<td>Diphtheria</td>
<td>Given as DPT; four doses at ages 2, 4, 6, and 15-18 months</td>
<td>10 years</td>
</tr>
<tr>
<td>Haemophilus</td>
<td>Four doses at ages 2, 4, 6, and 15 months</td>
<td>unknown</td>
</tr>
<tr>
<td>Influenzae (Hib)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hepatitis B</td>
<td>Three doses: at birth (for initial dose), 1 month later 6 months after second dose</td>
<td>unknown</td>
</tr>
<tr>
<td>Influenza</td>
<td>One dose (or two doses of split virus if under 13 year)</td>
<td>1-3 years</td>
</tr>
<tr>
<td>Lyme Disease</td>
<td>Three doses at ages 15-70 years old: at 0, 1, and 12 months, plan 3rd dose just before tick season</td>
<td>1 year; yearly</td>
</tr>
<tr>
<td>booster</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Measles</td>
<td>Given as MMR at ages 12-15 months and 4-6 years</td>
<td>Lifetime</td>
</tr>
<tr>
<td>Meningococcal</td>
<td>One dose (antibody response requires 5 days); antibiotic prophylaxis (Rifampin 600mg or 10 mg/kg Q 12 hour for four doses should be given to all contacts per exposure)</td>
<td>?Lifetime: not consistently effective in those &lt; 2 yrs old</td>
</tr>
<tr>
<td>Meningitis</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mumps</td>
<td>Given as MMR at ages 12-15 months and 4-6 years</td>
<td>Lifetime</td>
</tr>
<tr>
<td>Pertussis</td>
<td>Given as DPT; four doses at ages 2, 4, 6, and 15-18 months</td>
<td>10 years</td>
</tr>
<tr>
<td>Pneumococcus</td>
<td>One dose (0.5ml)</td>
<td>Approximately 5-10 years</td>
</tr>
<tr>
<td>Poliomyelitis</td>
<td>Four doses at ages 2, 4, and 6 months, then at age 4-6 years</td>
<td>Lifetime</td>
</tr>
<tr>
<td>Rabies</td>
<td>Post exposure: five doses on days 0, 3, 7, 14, and 28 with the rabies immune globulin; pre-exposure: two doses 1 week apart, third dose 2-3 weeks later</td>
<td>Approximately 2 years</td>
</tr>
<tr>
<td>Rubella</td>
<td>Given as MMR at ages 12-15 months and 4-6 years</td>
<td>Lifetime</td>
</tr>
<tr>
<td>Disease</td>
<td>Description</td>
<td>Duration</td>
</tr>
<tr>
<td>------------------</td>
<td>-----------------------------------------------------------------------------</td>
<td>----------------</td>
</tr>
<tr>
<td>Smallpox</td>
<td>One dose; this disease has been eradicated and vaccine is used. Only with</td>
<td>3 years</td>
</tr>
<tr>
<td></td>
<td>military personnel and lab workers using pox viruses.</td>
<td></td>
</tr>
<tr>
<td>Tetanus</td>
<td>Given initially as DPT; four doses at ages 2, 4, 6, and 15-18 months.</td>
<td>10 years; a</td>
</tr>
<tr>
<td></td>
<td>tetanus booster is required every 10 years.</td>
<td></td>
</tr>
<tr>
<td>VZV (varicellazoster; Chicken pox)</td>
<td>One dose (0.5 ml) age 12 months to 12 years; two injections of 0.5 ml 4-8 weeks apart in age 13 and older</td>
<td>? Lifetime</td>
</tr>
<tr>
<td>Yellow fever</td>
<td>One dose</td>
<td>10 years</td>
</tr>
</tbody>
</table>
### ACTIVE CHILDHOOD IMMUNIZATION SCHEDULE

<table>
<thead>
<tr>
<th>Vaccine</th>
<th>#1</th>
<th>#2</th>
<th>#3</th>
<th>#4</th>
</tr>
</thead>
<tbody>
<tr>
<td>DPT</td>
<td>2 MONTHS</td>
<td>4 MONTHS</td>
<td>6 MONTHS</td>
<td>15-18 MONTHS</td>
</tr>
<tr>
<td>OPV</td>
<td>2 MONTHS</td>
<td>4 MONTHS</td>
<td>6 MONTHS</td>
<td>4-6 YEARS</td>
</tr>
<tr>
<td>HIB</td>
<td>2 MONTHS</td>
<td>4 MONTHS</td>
<td>6 MONTHS</td>
<td>15-18 MONTHS</td>
</tr>
<tr>
<td>MMR</td>
<td>12 MONTHS</td>
<td>4 YEARS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>HEP B</td>
<td>BIRTH OR</td>
<td>1 MONTH AFTER</td>
<td>6 MONTHS OR MORE</td>
<td>AFTER SECOND DOSE</td>
</tr>
</tbody>
</table>

### ACTIVE ADULT IMMUNIZATION SCHEDULE

- **TETANUS**: TETANUS BOOSTER EVERY 10 YRS; WITH INJURY OBTAIN ONE IN 5 YRS
- **PNEUMOCOCCUS**: EVERY 5 YEARS
- **INFLUENZA**: EVERY YEAR
- **LYME COMPLETED**: YEARLY BOOSTER IN ENDEMIC AREAS AFTER SERIES

TRAVEL OUTSIDE USA CALL CDC: 1-877-394-8747 INTERNATIONAL TRAVELLER’S IMMUNIZATION
FINALLY! BABIES CAN GET THIS VACCINE

Advances in vaccine development finally make it possible to immunize infants and toddlers against meningitis and bacteremia - invasive infections caused by *Streptococcus pneumoniae*.

Every year in the United States, pneumococcal bacteria cause tens of thousands of cases of potentially life threatening invasive infection, including meningitis and bacteremia. At highest risk are the very young, the immunocompromised and the elderly.

For about two decades now, we've been able to immunize adults and children over age 2 against pneumococcal disease. But we had no effective vaccine to protect infants and toddlers until early last year, when Prevnar, pneumococcal conjugate vaccine, (PCV) was approved by the FDA for the prevention of invasive pneumococcal infection.

We are uniquely positioned to help ensure that this vaccine is used appropriately, and to serve as a source of health information for parents and the community. To help you do these things, we'll briefly review the impact of invasive and noninvasive pneumococcal disease and highlight Prevnar's effectiveness and cost. Then we'll focus on nursing considerations, including how and when administering the vaccine, adverse effects, and what to teach parents of children who receive it.

Infants and toddlers face a high risk of infection

Both noninvasive pneumococcal infections (including pneumonia and otitis media) and invasive infections (including bacteremia and meningitis) are caused by *Streptococcus pneumoniae*, a gram-positive bacterium that's a major source of illness and death worldwide. The organism may account for 30 - 50% of all cases of pneumonia in the United States each year. It's also responsible for about 40,000 deaths, 50,000 cases of bacteremia, and 3,000 cases of meningitis each year. About one third of these cases of bacteremia and about one quarter of these cases of meningitis occur in children younger than 5. Of particular note is the fact that children ages 2 and younger have the highest incidence of invasive pneumococcal infection of any age group.
Children who are especially at risk for pneumococcal infection include those who are of American Indian, Native Alaskan, or African American descent; have a chronic disease; are exposed to cigarette smoke; attend day care centers; or have a history of recurrent ear infections.

*Streptococcal pneumoniae* is also responsible for many cases of otitis media (ear infections) and sinusitis. Although these conditions are generally less serious than the ones mentioned previously, they nevertheless create a heavy burden in terms of treatment costs and days lost from school and work. For example, the bacteria causes approximately 7 million cases of otitis media each year, resulting in more than 15 million office visits.

**Assessing the value of the vaccine**

Research modeled on the success of the Hemophilus influenzae (Hib) vaccine led to the development of an effective pneumococcal vaccine for young children. Prevnar is a conjugated so named because a small amount of a highly immunogenic protein called diphtheria CRM is attached to the conventional pneumococcal vaccine molecule that’s used to immunize older children and adults. This step was necessary because the immature immune system of infants and toddlers cannot produce an effective immune response to the pneumococcal vaccine. However, this protein complex does produce a strong primary immune response in infants and a strong booster response on repeated vaccination.

Adding the protein did create one drawback. It resulted in a larger and more complex molecule, which limited the number of serotypes that could be included in a single vaccine. For that reason, Prevnar targets only seven serotypes of *Streptococcus pneumoniae* but these seven are responsible for 86% of all bacteremia, 83% of all meningitis, and 65% of all otitis media in children under 6 years of age in the United States. Prevnar’s efficacy and safety were evaluated in a randomized, prospective, double blind trial and researchers were able to demonstrate that the vaccine was 97% effective in preventing meningitis and bacteremia caused by the serotypes the vaccine targets. Blood and cerebrospinal fluid samples were used to make this determination.

By the researchers estimates, the routine vaccination with Prevnar of the roughly 3.8 million United States babies born each year will prevent 1 million cases of otitis media in these children. Currently the CDC (Center for Disease Control) is distributing the vaccine at a federal contract price of $45 per dose.
Vaccine administration and nursing considerations

The CDC's Advisory Committee recommends that all infants be given the vaccine at 2, 4, 6 months of age, followed by a booster dose at 12 - 15 months. Children who are 7 - 11 months old and have not received the vaccines should be given a total of three doses. Unvaccinated children who are 12 - 23 months old should get a total of two doses, and those who are 2 years of age or older need only one dose. They also recommend the vaccine for children 24 - 59 months of age who are at high risk for pneumococcal infection because of the underlying medical problem, such as sickle cell, HIV, a compromised immune system, diabetes, chronic cardiac or pulmonary disease (excluding asthma). Keep in mind that children who are receiving immunosuppressive therapy or have immune system disorders may not have a full response to the vaccine.

The preferred injection sites are the arm in toddlers and young children and the thigh in infants. You can administer Prevnar and other childhood vaccines during the same visit, but use a separate syringe to inject each vaccine, and administer each at a different site. The side effects of Prevnar are tenderness, erythema, and swelling, possible fever, irritability, drowsiness, restless sleep, decreased appetite, vomiting, diarrhea, rash or hives. Severe reactions although rare are possible. With this in mind, be sure to ask parents if their child has had an allergic or otherwise adverse reaction to previous immunizations. Epinephrine is the drug of choice for any kind of a serious side effect. Consider postponing immunization of a child has a moderate to severe febrile illness.

Resources to help you educate parents

It is important that you help ensure that parents understand the risks and benefits of childhood immunizations. You should also make sure that they are informed of the recommended administration schedule. In teaching parents about Prevnar discuss the types of disease caused by the *Streptococcus pneumoniae*, the efficacy and potential side effects of the vaccine, and which children should or should not receive it. Tell them that it is not unusual for a child to develop a mild fever and redness, tenderness, or swelling at the injection site after immunization. They should treat these reactions with cold compresses to the injection site and by giving their child acetaminophen at doses appropriate for his age and weight. In some children, the presence of aluminium in the Prevnar suspension may cause a nodule (bump) to develop at the injection site, which could last for several weeks.
until it is fully absorbed. Finally remind the parents to promptly report any serious side effects, such as high fever, difficulty in breathing, hives, or unusual behavior, to your health care provider who administered the vaccine.
VITAMINS

Recommended Dietary Allowances are the recommended human vitamin and mineral intake requirements. These were developed by the Food and Nutrition Board, National Research Council of the National Academy of Sciences and have evolved over the past 50 years and are updated every 5 years. They are only estimates of nutrient needs; each client and the surrounding factors warrant individualized evaluation when replacement is being considered. Clients with impaired liver function should not take large amounts of fat soluble vitamins (Vitamins A, D, E, K,) unless specifically prescribed due to the toxicity potential from cumulative effects.

VITAMINS

<table>
<thead>
<tr>
<th>NAME</th>
<th>DAILY DOSE</th>
<th>PHYSIOLOGIC EFFECTS ESSENTIAL FOR:</th>
</tr>
</thead>
<tbody>
<tr>
<td>A (Retinol, Retinaldehyde, Retonic acid)</td>
<td>1400-6000 IU</td>
<td>Growth &amp; development, epithelial tissue, maintenance, reproduction, prevents night blindness</td>
</tr>
<tr>
<td>B complex</td>
<td></td>
<td></td>
</tr>
<tr>
<td>B-1 (Thiamine)</td>
<td>0.3-1.5 mg</td>
<td>Energy metabolism: normal nerve function</td>
</tr>
<tr>
<td>B-2 (Riboflavin)</td>
<td>0.4-1.8 mg</td>
<td>Reactions in energy cycle that produce ATP; oxidation of amino acids and hydroxyl acids; oxidation of purines</td>
</tr>
<tr>
<td>B-3 Niacin (Nicotinic Acid, Nicotinamide)</td>
<td>5-19 mg</td>
<td>Synthesis of fatty acids and cholesterol; blocks FFA; conversion of phenylalanine to tyrosine</td>
</tr>
<tr>
<td>B-6 (Pyridoxine, Pyridoxal, Pyridoxamine)</td>
<td>0.3-2.5 mg</td>
<td>Amino acid metabolism; glycogenolysis, RBC/Hb synthesis; formation of neuro transmitters; formation of antibodies</td>
</tr>
<tr>
<td>Folacin (Folic Acid Pantotherate, Dexpanthenol)</td>
<td>50-800 mcg</td>
<td>DNA synthesis, formation of RBC's in bone marrow with cyanocobalamin</td>
</tr>
<tr>
<td>Pantothenic Acid (Calcium Pantothenate, Dexpanthenol)</td>
<td>10 mg</td>
<td>Synthesis of sterols, steroid hormones; porphyrins; synthesis and degradation of fatty acids; oxidative metabolism of carbohydrates, gluconeogenesis</td>
</tr>
<tr>
<td>Vitamin</td>
<td>Description</td>
<td>Recommended Intake</td>
</tr>
<tr>
<td>---------</td>
<td>-------------</td>
<td>-------------------</td>
</tr>
<tr>
<td>B-12 (Cyanocobalamin, Hydroxocobalamin, extrinsic factor)</td>
<td>0.3-4.0 mcg</td>
<td>DNA synthesis in bone marrow; RBC production with folacin; nerve tissue maintenance</td>
</tr>
<tr>
<td>B-7 (Biotin)</td>
<td>No recommendation</td>
<td>Synthesis of fatty acids; generation of tricarboxylic acid cycle; formation of purines Coenzyme in CHO metabolism</td>
</tr>
<tr>
<td>C (Ascorbic Acid Ascorbate)</td>
<td>60 mg</td>
<td>Formation of collagen; conversion of cholesterol to bile acids; protects A and E and polyunsaturated fats from excessive oxidation; iron; converts folacin to folinic acid; some role in clotting, adrenocortical hormones, and resistance to cancer and infections</td>
</tr>
<tr>
<td>D (Calcitriol, Cholecalciferol)</td>
<td>400 IU</td>
<td>Intestinal absorption and metabolism of calcium and dihydrotachysterol, ergocalciferol phosphorus as well as renal reabsorption; release of viosterol calcium from bone and reabsorption</td>
</tr>
<tr>
<td>E (Tocopherol)</td>
<td>4-15 IU</td>
<td>May oppose destruction of Vitamin A and fats by oxygen fragments called free radicals; antioxidant; may affect production of prostaglandins which regulate a variety of body processes</td>
</tr>
<tr>
<td>K (Menadione, Phytonadione)</td>
<td>No recommendation</td>
<td>Formation of prothrombin and other clotting proteins by the liver; blood coagulation</td>
</tr>
<tr>
<td>VITAMIN</td>
<td>EFFECT</td>
<td>USES</td>
</tr>
<tr>
<td>---------------</td>
<td>---------------------------------------------</td>
<td>---------------------------------------------------</td>
</tr>
<tr>
<td>A (Retinoic Acid)</td>
<td>Reduces formation of comedones; keratin production suppression</td>
<td>Acne, psoriasis, ichthyosis, Darier's disease, xerophthalmia, intestinal infections, prevents night blindness</td>
</tr>
<tr>
<td>Niacin</td>
<td>Reduction of blood cholesterol and triglycerides, blocks FFA release</td>
<td>Hypercholesterolemia, hyperbeta lipoproteinemia</td>
</tr>
<tr>
<td>D (Dihydrotachysterol)</td>
<td>Maintains calcium and phosphorus levels in bone and blood</td>
<td>Hypoparathyroidism; increase intestinal absorption of calcium</td>
</tr>
<tr>
<td>C</td>
<td>Reduces urine pH; converts methemoglobin to hemoglobin</td>
<td>Idiopathic methemoglobin; recurrent UTIs in high risk clients; aids in iron absorption</td>
</tr>
<tr>
<td>E</td>
<td>Reduces endogenous peroxidases</td>
<td>Hemolytic anemia in premature Infants; protects cell membranes from oxidation</td>
</tr>
<tr>
<td>K</td>
<td>Increases liver production of thrombin</td>
<td>Warfarin toxicity essential for blood coagulation</td>
</tr>
</tbody>
</table>
## VITAMIN DEFICIENCY STATES

<table>
<thead>
<tr>
<th>VITAMIN</th>
<th>DEFICIENCY</th>
<th>SIGNS AND SYMPTOMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Xerophthalmia</td>
<td>Progressive eye changes, night blindness to xerosis of conjunctiva and cornea with scarring</td>
</tr>
<tr>
<td></td>
<td>Keratomalacia</td>
<td>Degeneration of epithelial cells with hardening and shrinking</td>
</tr>
<tr>
<td>B-6</td>
<td>Beriberi</td>
<td>Fatigue, weight loss, weakness, irritability headaches, insomnia, peripheral neuropathy, CHF, cardiomyopathy</td>
</tr>
<tr>
<td>Niacin</td>
<td>Pellagra</td>
<td>Depression, anorexia, beefy red glossitis, cheilosis, dermatitis</td>
</tr>
<tr>
<td>B-12</td>
<td>Pernicious anemia</td>
<td>Macrocytic, megablastic anemia; progressive neuropathy R/T, demyelination</td>
</tr>
<tr>
<td>C</td>
<td>Scurvy</td>
<td>Joint pain, growth retardation, anemia, poor wound healing with increased susceptibility to infection, petechial hemorrhages</td>
</tr>
<tr>
<td>D</td>
<td>Rickets (child)</td>
<td>Demineralization of bones and teeth with bone pain and skeletal muscle deformities</td>
</tr>
<tr>
<td></td>
<td>Osteomalacia (adult)</td>
<td></td>
</tr>
<tr>
<td>E</td>
<td>Hemolytic anemia in low birth weight infants</td>
<td>Macrocytic anemia; increased hemolysis of RBC's and increased capillary fragility</td>
</tr>
<tr>
<td>K</td>
<td>Hemorrhagic disease in newborns</td>
<td>Increase tendency to hemorrhage (Rx)</td>
</tr>
</tbody>
</table>
BATTEN DISEASE

EXPERIMENTAL DRUGS AND OTHERS

INDEX

CLOBAZAM/FRISIUM

CYSTAGON

FLUPIRTINE

DRUG WARNING
**CLOBAZAM/FRISIUM**

*(Anticonvulsant)*

*(Available only in Europe and Canada)*

**Indication:** Anticonvulsant, tonic clonic, complex partial, myoclonic seizures

**Action:** Potentiates GABA (gamma aminobutyric acid) energetic neuro transmission, increasing the efficiency of GABA (gamma aminobutyric acid) energetic synaptic inhibition which leads to a decrease in the rate of firing of critical neurons in the brain

**Adverse Reactions:**
- **CNS:** Drowsiness, severe dizziness, lack of coordination and fatigue (with an increase dose at the beginning of treatment), irritability, paradoxical excitement, depression, disorientation, confusion, lethargy, ataxia, tremors, increased or decreased motor activity, restlessness, slurred speech, behavioral changes
- **Respiratory:** Trouble breathing
- **Cardiovascular:** Rapid pounding irregular heart rate
- **EENT:** Changes in vision
- **GI:** Nausea, vomiting, weight gain, constipation, loss of appetite, dry mouth
- **Musculoskeletal:** Weakness, tremor
- **Skin:** Allergic skin reaction, itching, swelling

**Dosages:** 10 - 30 mg daily preferably at bedtime or in divided doses, tablets

**Nursing Considerations:** Take with food to minimize indigestion, tolerance may develop after 1 - 6 months of treatment, may cause dependence. Blood counts and other lab tests are advised if this medication is used for a prolonged period.
**CYSTAGON/PHOSPHOCYSTEAMINE**

*(Used in a trial with INCL)*

**Indications:** To treat lysosomal storage disease in INCL

**Action:** It disrupts the thioester linkages in a high energy thioester substrate palmitoyl CoA releasing palmitoyl acid, it also mediates the depletion of intracellular deposits and prevents their reaccumulation.

**Adverse Reactions:**

**CNS:** Drowsiness at very high levels, lethargy, somnolence, encephalopathy, seizures, headache, ataxia, confusion, tremor, dizziness, jitteriness, nervousness, abnormal thinking, emotional lability, hallucinations, nightmares, depression, hyperkinesias

**Cardiovascular:** Hypertension

**EENT:** Decreased hearing

**GI:** Nausea, vomiting, anorexia, abnormal pain (may be severe), diarrhea, bad breathe, dyspepsia, constipation, gastroenteritis, duodenitis, duodenal ulceration

**Skin:** Rash, urticaria

**Other:** Fever, dehydration

**Dosage:**

Start with low dose of 10 mg/kg/day in 4 equal dosages, slowly increase the amount to 60mg/kg/day over a 4 - 6 week period every 6 hours depending on age and weight, capsules.

**Nursing Considerations:** For small children who can not swallow a capsule, the contents of the capsule can be dissolved in a small amount of formula, following other liquid, pudding, applesauce, for the drug to be clinically useful, the needs to be met are:

a.) be relatively non toxic,

b.) must reach the lysosomal compartment of the cell in which abnormal deposits of ceroids causes INCL (Infantile Neuronal Lipofuscinosis/Infantile Batten Disease),

c.) must be effective at a low pH in disrupting thioester linkages, cross the blood brain barrier,

d.) must prevent apoptosis,

- The children will be admitted to the hospital for 4 - 5 days.
- History, including a detailed account of seizures
(number/day, length of each seizure longest and shortest)
- CBC with differential, calcium, phosphorus, magnesium, uric acid, blood urea nitrogen, creatinine, cholesterol, triglycerides, PT, PTT, thyroid studies, sedimentation rate, platelet, electrolytes, function, prolactin, somamendedin C, 
- EM's for GROD's, skin biopsy,
- Consult with ophthalmologic doctor - external eye exam, ocular motility, slit lamp, dilated fundoscopic, and testing of visual acuity, an ERG for retinal function which will require mild sedation, and a neurological exam.
- At the end of 6 and 12 months the patient will be re evaluated with an ERG, 24 months the patient will be re evaluated with ERG, MRI, EEG, electron microscopic analysis, WBC's and skin fibroblasts for GROD's.
- Age limit for the study is 6 months - 2 years.
- These children have mild - moderate neurological deficiency but are well enough to be cared for at home by the family.
- Monitor lab values, report rash, GI (gastrointestinal) intolerance.
FLUPIRTINE
(used with Late Infantile Batten Disease)

Indications: Has cyto and neuroprotective potential, as well as, anticonvulsant and myo-relaxant effects, also sedative effect

Action: Reverses akinesia and rigidity in Dopamine depletion, can attenuate cerebral and retinal ischemic dysfunction, has an antagonistic action on neuro-transmission and neuro toxicity mediated by NMDA receptors, it counter acts calcium increase in challenged cells, possibly by facilitation of calcium transport into the mitochondria

Adverse Reactions: CNS: Fatigue, drowsiness, dizziness, headache, sleep disturbance
GI: Nausea, vomiting, dry mouth
Skin: Itching

Dosage: 10 - 20 mg/kg/day tablets

Nursing Considerations: No severe side effects have been reported, but report any side effects that occur after beginning the drug.
DRUG WARNING – SERZONE

Serzone (Nefazodone Hydrochloride) is a medicine used to treat depression. It is thought to treat depression by correcting an imbalance in the amounts of certain natural chemicals, such as Serotonin and Norepinephrine, which are in your brain.

The reason for this drug alert is that there have been reports that patients are developing serious liver problems with the following symptoms:
- Yellowing of the skin or whites of the eyes (jaundice)
- Unusually dark urine
- Loss of appetite that lasts several days or longer
- Nausea
- Abdominal (lower stomach) pain
People who currently have liver problems should not take Serzone.

Who should not take Serzone?
- An allergy to Serzone
- Are taking any of the following other medications:  Seldane (an antihistamine), Propulsid (heartburn), Halcion (sleeping pill), Orap (used in Tourette’s Syndrome), Tegretol (seizures)
- Currently with liver problems
- Are taking or have taken within the last 14 days one of the medicines for depression called MAOI’s – Monoamine Oxidase Inhibitors (Nardil, Parnate).

Be sure to tell your Doctor if you:
- Have ever had liver problems
- Are taking any other medicine, vitamin supplement, or herbal remedy, including those sold over the counter
- Have heart problems or have had a heart attack or stroke
Have had manic episodes (extreme agitation or excitability)
Have ever attempted suicide
Have had seizures

If you are taking Serzone, how should it be taken?
May take with or without food
Even though you are feeling better, continue taking the medicine
If you miss a dose, skip that dose and get back on a regular schedule,
do not take two at one time
If you have taken more than prescribed, contact your doctor, local
poison control center, or emergency room

What should I avoid while taking Serzone?
Do not drive or operate machinery until you know how Serzone affects
you
Make sure you tell your doctor about any other medications, herbal
remedies, or over the counter drugs you may be taking
Do not drink alcohol while taking Serzone

What are the possible side effects of Serzone?
Yellowing of the skin or eyes (jaundice)
Unusually dark urine
Loss of appetite that lasts several days or longer
Severe nausea
Abdominal (lower abdominal) pain
Rash or hives
Seizures
Fainting

As parents of children with Batten Disease, we urge
you to strongly consider the side effects before
giving this drug to your child.
MEDICATION GLOSSARY

A

Abrasion - scraping away of a portion of skin or of a mucous membrane as a result of an injury or mechanical means as in cosmetic surgery
Absence - petit mal seizure
Acetylcholine - it plays an important role in the transmission of nerve impulses at synaptic and myoneural function
Acidosis - a disturbance in the acid base balance of the body in which there is an accumulation of acids or an excessive loss of bicarbonates
Acromegaly - a chronic syndrome of growth hormone excess, most often caused by a pituitary macroadenoma. It is characterized by gradual coarsening and enlargening of bones and facial features. The diagnosis is suggested by a growth hormone level that does not suppress after glucose administration. It is confirmed by radiologic imaging of the pituitary gland
Addison's Disease - a rare illness marked by gradual and progressive failure of the adrenal glands and insufficient production of steroids and hormones. These patients make inadequate amounts of both glucocorticoids and mineralcorticoids
Adhesions - a "holding together" or uniting of two surfaces or parts, as in wound healing. A fibrous band holding parts together that are normally separated. Adhesions of the abdominal cavity, usually involving the intestines; caused by inflammation or trauma. If adhesions cause great pain or intestinal obstruction, they are treated surgically
Adrenal - the adrenal gland or its secretions. Either of two secretory glands perched atop the kidneys. Each consists of two parts having independent functions: the cortex and the medulla. The adrenal cortex, in response to adrenocorticotropic hormone secreted by the anterior pituitary, secretes cortisol and androgens. Adrenal androgens serve as precursors that are converted by the liver to testosterone and estrogens. Rennin from the kidney controls adrenal cortical production of aldosterone. The adrenal medulla manufacturers the catecholamines epinephrine and norepinephrine
Adrenergic - relating to nerve fibers that release norepinephrine or epinephrine at synapses
Adventitious - acquired, accidental, arising sporadically
Agitation - excessive restlessness, increased mental and physical activity
Agoraphobia - overwhelming symptoms of anxiety that occur on leaving home; a form of social phobia. The attack may occur in everyday situations (standing in line, eating in public, in crowds of people, on bridges or in tunnels, while driving) in which a person may be unable to escape or get help and may be embarrassed. Symptoms often include rapid heart rate, chest pain, difficulty breathing, gastrointestinal distress, faintness, dizziness, weakness, sweating, fear of losing control or going crazy, and fear of dying or impending doom. People with these symptoms often avoid phobic situations by rarely, if ever, leaving home.

Agranulocytosis - an acute disease in which the white blood cell count drops to extremely low levels, too low to fight infections. May be caused by drugs or radiation.

Akathisia - motor restlessness; intolerance of inactivity. This symptom may appear as a side effect of antipsychotic drug therapy.

Akinesia - complete or partial loss of muscle movement.

Akinetic - the inability to perform a spontaneous movement; a state in which a person is unable or refuses to move or to make sounds, resulting from neurological or psychological disturbance.

Alanine aminotransferase - ALT - an intracellular enzyme involved in amino acid and carbohydrate a - presence of detectable amounts of protein etc. in the urine, usually a sign of metabolism. It is present in high concentrations in muscle, liver, and brain. An increased level in this enzyme in the blood indicates necrosis or disease in these tissues. Its measurement is most commonly used as part of the differential diagnosis of liver disease and in the tracking of the course of the disease process. This enzyme was formerly called serum glutamic pyruvic transaminase (SGPT).

Albuminurirenal impairment

Alkaline phosphatase - an enzyme, involved in bone mineralization, that hydrolyzes phosphoric esters and functions optimally at 9.3 pH. Most alkaline phosphatase in normal serum is derived from the bone, but the enzyme is produced also in the liver, intestinal mucosa, placenta, breast, and other tissues. Levels are high in the first few months of life, again during bone growth in preadolescence, and then decrease in senility, anemia and malnutrition.

Alkalosis - an actual or relative increase in blood alkalinity due to an accumulation of alkalies or reduction of acids. An abnormal acid base condition in the body fluids, characterized by a tendency toward an increased pH, as from an excess of alkaline bicarbonate or a deficiency of acid. Respiratory alkalosis may be caused by hyperventilation, central nervous system disease, congestive heart failure, pulmonary embolism, or early salicylate intoxication. This results in an excess loss.
of carbon dioxide and a carbonic acid deficit. Metabolic alkalosis may result from loss of acid (such as from prolonged vomiting or nasogastric suction), retention or excess intake of bicarbonate or renal mechanisms associated with decreased serum levels of potassium and chloride.

**Alopecia** - natural or abnormal baldness, deficiency of hair, partial or complete.

**Alpha-adrenergic** - a term given to nerve fibers which when stimulated release epinephrine (adrenaline).

**Amblyopia** - reduced or dimness of vision, not dependent upon visible changes in the eye and not a refractive error (alcoholic, astigmatic, diabetic, tobacco, quinine, uremia).

**Amenorrhea** - absence of monthly menstrual flow, maybe due to multiple reasons.

**Amino acid** - one of a large group of organic compounds marked by the presence of both an amino (NH2) group and a carboxyl (COOH) group. Amino acids are the building blocks of proteins and the end products of protein digestion. Approximately 80 amino acids are found in nature, but only 20 are necessary for human metabolism or growth. Of these, some can be produced by the liver, the rest, called the essential amino acids, must be supplied by food. These are histidine, isoleucine, leucine, lysine, methionine, cysteine, phenylalanine, tyrosine, threonine, tryptophan, and valine. The nonessential amino acids are alanine, aspartic acid, asparagine, citrulline, glutamic acid, glycine, hydroxyglutamic acid, hydroxyproline, norleucine, praline, and serine. Oral preparations of amino acids may be used as dietary supplements.

**Ammonia** - a gas formed by decomposition of nitrogen containing substances such as proteins and amino acids. It is converted to urea in the liver. It will turn litmus paper blue.

**Amphetamine** - a central nervous stimulant, can be used in the treatment of alcoholism, narcolepsy (sleeping too much) and certain types of mental depression.

**Amygdaloid** - resembling the shape of an almond.

**Amylase** - a class of enzymes that split or hydrolyze starch. Those found in animals are called alpha amylases; those in plants are called beta amylases.

**Analgesic** - a medicine, which relieves pain.

**Anaphylaxis** - the reactions which cause anaphylactic shock occur suddenly (minutes to an hour), including increased irritability, shortness of breath, turning “blue”, sometimes convulsions, unconsciousness and death, death usually results from spasms of muscles or bronchioles.
Anemia – a condition in which there is a reduction in number of circulating red blood cells (hemoglobin) may be caused from excessive blood loss, reduction in red blood cell formation.

Angina – pain around the heart can be radiating to shoulder, arm or hand, or occasionally to the stomach.

Angioedema – an allergic disorder characterized by swelling and a rash around the tissues.

Angioneurotic – a swelling characterized by development of local allergic rash (wheals) accompanied by swelling of the subcutaneous or submucous tissues. It is thought to be an allergic disorder, examples: hives, ertularia, and angioedema.

Anhidrosis – diminished or complete absence of secretion or sweat, may be generalized or localized, temporary or permanent, accompanying disease conditions or may be a congenital anomaly.

Antacids – an agent that will neutralize acidity especially in the digestive tract.

Antagonist – that which counteracts the action of anything, as a muscle or drug.

Anthelmintic – an agent that treats or destroys parasitic worms.

Antiarrhythmic – a drug or physical force that acts to control or prevent cardiac arrhythmias (irregular or loss of rhythm of the heart; irregular heart action caused by physiological or pathological disturbances in the discharge of cardiac impulses from the sinus node or their transmission through conduction tissues of the heart.

Antibiotics – are produced by bacteria, molds and fungi and have the power to inhibit the multiplication of, or destroy other organisms, especially bacteria.

Anticholinergic – impeding the impulses or actions of the parasympathetic nerves, controlling the constriction of the pupil, contraction of smooth muscle plus many other uses.

Anticoagulant – delaying or preventing coagulation.

Antiparkinson – any agent used to control the symptoms of Parkinson’s disease – a chronic nervous disease characterized by a fine, slowly spreading tremor, muscular weakness and rigidity and a peculiar gait.

Antipyretics – an agent that reduces a temperature – example, Tylenol, Aspirin, Ibuprofen.

Anti-tuberculin – inhibiting the spread of TB through the body, an infectious disease caused by the tubercle bacillus, most often affects the respiratory system. Acute cases require confinement due to the very contagious state in the respiratory system.

Anxiolytic – counteracting or relieving anxiety, a drug that relieves anxiety.

Apathy – indifference, without emotion, sluggish.
Aphasia - inability to express oneself properly through speech, or loss of verbal comprehension, it is considered to be complete or total when both sensory and motor areas are involved
Aplastic anemia - a deficiency of all of the formed elements of the blood, representing a failure of the cell generating capacity of the bone marrow. It may be caused by neoplastic disease of the bone marrow, or more commonly by destruction of the bone marrow by exposure to toxic chemicals, ionizing radiation, or some antibiotics or other medications. Rarely, an idiopathic form of the disease occurs
Apnea - temporary or permanent cessation of breathing and therefore, of the body's intake of oxygen and release of carbon dioxide. It is a serious symptom, especially in patients with other potentially life threatening conditions
Apoptosis - cell death as in what happens to the brains in Batten Disease
Arrhythmia - irregular heart action caused by disturbances either physiological or pathological
Arteriosclerosis - a disease of the arterial vessels marked by thickening, hardening, and loss of elasticity in the arterial walls. Three forms of arteriosclerosis are generally recognized: atherosclerosis, sclerosis of arterioles, and calcific sclerosis of the medial layer of arteries. Atherosclerosis is the single most cause of disease and death in Western societies
Arthralgia - pain in a joint
Arthrosis - increased joint pain due to degeneration
Articulation - the connection of bones, a joint, classified as immovable, slightly movable or freely movable
Aspartate aminotransferase - AST, an intracellular enzyme involved in amino acid and carbohydrate metabolism. It is present in high concentrations in muscle, liver, and brain. An increased level in this enzyme in the blood indicates necrosis or disease in these tissues. Formerly called serum glutamic oxaloacetyic transaminase (SGOT)
Aspiration - to draw in or out as by suction, foreign bodies may be aspirated into the nose, throat, or lungs on inspiration, can also cause pneumonia by getting food or fluids in the lung because of poor swallowing ability
Asthenia - lack or loss of strength, debility, any weakness usually originating in muscular or cerebellar disease
Asthma - a respiratory disorder characterized by recurring episodes of paroxysmal dyspnea, wheezing on expiration, coughing, and vicious mucoid bronchial secretions. The episodes may be precipitated by inhalation of allergens or pollutants, infection, vigorous exercise, or emotional stress. Treatment includes
elimination of the causative agent, hyposensitization, aerosol or oral bronchodilators, and short term use of corticosteroids. Beta adrenergic drugs, barbiturates, and narcotics are contraindicated. Repeated attacks often result in emphysema and permanent obstructive lung disease.

Ataxia - a disorder or irregularity, a muscular incoordination especially that manifested when voluntary muscular movements are attempted.

Atrial fibrillation - irregular and rapid contractions of the heart where the atria and the ventricles are working independently, heart rate can be slow (in the 30's or very fast in the 200's), seen when the heart muscle begins to deteriorate.

Atropine - used to overcome spasm of involuntary muscles, to help decrease secretions, also used to dilate pupils before testing eyes for glasses to relieve muscle spasm, and to increase heart rate.

Atypical - deviating from the normal.

Auditory - pertaining to the sense of hearing.

Aura - the preepileptic phenomenon where one is aware of a seizure that will be occurring shortly.

Auscultation - listening for sounds within the body, especially, from the chest, neck, or abdomen. A stethoscope is used, applied to the patient's skin surface gently but firmly, to eliminate any environmental noises that may be present. Auscultation is used to detect heart rate and rhythm and any cardiac murmurs, rubs, or gallops; crackles or wheezes in the lungs; pleural rubs; or movement of gas or food through the intestines.

Autonomic - spontaneous, self controlling, a part of the nervous system, which is concerned with control of involuntary bodily functions, it controls glands, smooth muscle and the heart.

AV conduction - atrio ventricular, pertaining to both the atrium and ventricles of the heart.

Azotemia - presence of urea (waste products) in the blood.

B

Babinski - a reflex seen by stroking the side or sole of the foot: positive is a slight spreading of the toes seen in neurological diseases.

Bacteremia - bacteria in the blood.

Bacteriostatic - inhibiting or retarding bacterial growth.

Balanitis - inflammation of the glans penis and the mucous membranes beneath it with a puss-like drainage.

Barbiturates - a classification of drugs used as hypnotics, it is habit forming.
Basal Cell Ca (cancer) - a form of cancer

Basal ganglia - four masses of grey matter located deep in the cerebral hemispheres. The function of the basal ganglia is complex. They contribute to some of the subconscious aspects of voluntary movement such as accessory movements and inhibiting tremor. They do not initiate movement but rather provide coordination of complex motor circuits. Neurotransmitters that affect the basal ganglia are acetylcholine, Dopamine, GABA (gamma aminobutyric acid), and Serotonin

Benadryl - an antihistaminic agent or also given before many tests where patients are allergic to dyes, etc

Benzodiazepines - a classification of drugs to treat anxieties

Beriberi - a deficiency disease (Thiamine) associated with malnutrition, diet is usually low-fat, low-protein, high carbohydrate like high intakes of rice in Orient

Beta-carotene - a yellow pigment present is carrots, squash, or corn

Biliary tract - pertaining to a tract that conveys bile in the gall bladder, and from the liver to the hepatic ducts

Bilirubin - the orange colored or yellowish pigment in bile carried to the liver by the blood

Bipolar - having two poles or processes as in electro therapeutic treatments, seen in psychiatric disorders

Blastomycosis - infection caused by inhalation of the fungus (Blastomyces dermatitidis). May produce inflammatory lesions of the skin (cutaneous form) or lungs or a generalized invasion of the skin, lungs, bones, central nervous system, kidneys, liver, and spleen

Blepharoptosis - drooping of the upper eyelid

Blepharospasm - a twitching or spasmodic contraction of the orbicularis oculi muscle due to tics, eyestrain, or nervous irritability

Bone marrow - the soft tissue in the marrow cavities of the long bones (yellow marrow) and in the spaces between trabeculae (a cord of tissue) of spongy bone in the sternum and other flat and irregular bones (red marrow). Yellow marrow is mostly fat, stored energy. Red marrow produces all the types of blood cells

Bowel - the intestine, colon

Bradycardia - a normal heart rhythm with a rate of 60 or below in an adult or 70 in a child

Bradykinesia - extreme slowness of movement

Brain stem - part of the brain at the base of the neck which includes center for regulating and coordinating body activities, perception, the seat of consciousness, thought, memory, reason, judgment and emotion, through reflex centers automatic
control of body activities are maintained most important being cardiac, vasomotor, and respiratory centers which regulate circulation and respiration

**Brompton’s Cocktail** - a mixture of cocaine, morphine and antiemetics formerly used to alleviate pain and induce euphoria, especially in patients with cancer

**Bronchial** - a primary division of the trachea, which extends into each lung

**Bronchitis** - inflammation of the bronchial mucous membrane, which a bronchus splits off of the trachea and goes into each lung

**Bronchodilator** - a drug that expand the bronchi by relaxing bronchial muscle. There are three classes of bronchodilators: B2adrenergic-receptor agonists, Methylxanthines and Anticholinergic agents; the B2 adrenergic receptor agonists produce the greatest bronchodilitation in patients with bronchial asthma. The beta2, adrenergic receptor agonists are the best drugs for patients with mild, intermittent asthma and for acute attacks of reactive airway disease

**Bronchopneumonia** - a type of pneumonia marked by scattered consolidation (areas filled with inflammatory exudates) in one or more lobes of the lung. It occurs primarily in infants and in elderly persons, both of whom have decreased resistance to bacterial and viral infections. It is often a complication of bronchitis

**Broncho-spasm** - spasm of the bronchus, which the trachea divides into 2 bronchi, which ends, one in each lung

**Bruxism** - the grinding of the teeth in children especially during sleep. If untreated, it can damage teeth and the temporomandibular joint. In severe cases the teeth are worn down to nothing

**Bulbous-exfoliative** - a bulb shaped swelling around an area that is scaling off dead tissue as in an exfoliation of a bone

**Bundle branch block** - a defect in the heart's construction system whereas there is failure of the conduction down one of the main branches

**Bursitis** - inflammation of a bursa especially those located between bony prominences and muscle or tendons, as the shoulder or knee

*C*

**Cachexia** - a state of ill health, malnutrition, or wasting, it may occur in many chronic diseases

**Calculi** - commonly called a “stone” - seen in the kidney or bladder, usually composed of mineral salts, calcium

**CAD - coronary artery disease** - one of a pair of arteries which supply blood to the muscles of the heart, they arise within the right and left aortic sinuses at the
base of the aorta, a narrowing or spasm of these arteries induces attacks of pain, in disease artery is “clogged” with plaque

**Calcium oxalate** - a calcium containing substance present in the urine in crystalline form. It is a constituent of some kidney stones

**Calculi** - any abnormal concretion, commonly called a stone, within the animal body. A calculus is usually composed of mineral salts, and can be found in the gallbladder, kidneys, ureter, bladder, or urethra

**Candidiasis** - infection of the skin or mucous membrane with any species of Candida. Candida grows in warm moist areas, causing superficial infections of the mouth, vagina, nails, and skin folds of healthy individuals. Sometimes very difficult to get rid of

**Cardiac arrest** - heart stops due to many reasons with the main one being heart attacks

**Cardiomegaly** - enlargement of the heart

**Cardiomyopathy** - any disease that affects the heart muscle, diminishing heart performance

**Cardiovascular** - pertaining to the heart and blood vessels

**Cardioversion** - the restoration of normal sinus rhythm by chemical or electrical means. When preformed mechanically, the procedure relies on or the oral or intravenous administration of antiarrhythmic drugs. Electrical cardioversion relies instead on the delivery of synchronized shock of direct electrical current across the chest wall. It is used to terminate arrhythmias such as atrial flutter, supraventricular tachycardia, and well tolerated ventricular tachycardia. Unlike defibrillation, which is an unsynchronized shock, applied during a dire emergency, electrical cardioversion is timed to avoid the T wave of cardiac repolarization to avoid triggering malignant arrhythmias. A patient will almost always require sedation and analgesia before the procedure

**Carnitine** - a chemical important in metabolizing palmitic and stearic acids. It has been used therapeutically in treating myopathy due to carnitine deficiency. In children that are on Depakote, you need to have their Carnitine levels checked periodically due to the fact that Depakote pulls Carnitine from the body system

**Carpal tunnel** - pain or numbness that affects some part of the median nerve distribution of the hand (the palmer side of the thumb, the index finger, the radial half of the ring finger, and the radial half of the palm) and may radiate to the arms. Patients may have a history of cumulative trauma to the wrist in carpenters, rowers, typists, computer users, or those who regularly use vibrating tools or machinery

**Cascara** - It is the main ingredient in a laxative which is supposed to be fairly good
**Cataplexy** - a sudden brief loss of muscle control brought on by strong emotion or emotional response, such as a hearty laugh, excitement, surprise, or anger. Although this may cause collapse, the patient remains fully conscious. This episode lasts for a few seconds to as long as a few minutes. The condition may be less severe with age. About 70% of patients with narcolepsy have cataplexy. Imipramine is beneficial in treating this disorder.

**Cataracts** - opacity or cloudy looking of the lens of the eye or its capsule or both

**Catatonic** - a phase of schizophrenia in which the patient is unresponsive, the tendency is to remain and assume in a fixed position, refusal to move or talk are characteristics

**Catecholamines** - one of many biologically active amines, including Metanephrines, Dopamines, Epinephrine and Norepinephrine, derived from Amino and Tyrosine. They have a marked effect on the nervous and cardiovascular systems, metabolic rate, temperature, and smooth muscle

**Cathartic** - a laxative

**CBC** - lab test, which measures many different tests including the red blood cells (hemoglobin), the white blood cells (which will tell if a possible infection is occurring) and what kind of cell is most prevalent of the white cells, also checks the blood clotting factor

**Cerebral artery insufficiency** - pertaining to the cerebrum, the largest part of the brain, the area where a lot of strokes occur due to insufficient blood supply

**Cerebral palsy** - bilateral symmetric non-progressive paralysis resulting from developmental defects in the brain or trauma at birth

**Cerebral spinal fluid** - the fluid that flows through and protects the four ventricles of the brain, the subarachnoid space, and the spinal canal. It is composed primarily of secretions of the choroids plexi in the lateral ventricles and in the third and fourth ventricles in the brain. Openings in the roof of the fourth ventricle allow the fluid to flow into the subarachnoid spaces around the brain and the spinal cord. The flow of fluid is from the blood in the choroids plexi, through the ventricles, the central canal, the subarachnoid spaces, and back into the blood. The volume of fluid in an adult is approximately 140 ml. Changes in the carbon dioxide content of CSF affect the respiratory center in the medulla, helping to control breathing. Certain illnesses and various diagnoses may require microscopic examination and chemical analysis of CSF. Samples of the fluid may be removed by lumbar puncture

**Cerebrovascular** - pertaining to the blood vessels of the brain especially to pathological changes

**Ceroids** - morbid condition of membranes resembling wax-like scales
Cervical erosion - a wearing away of the cervix in the uterus of females

Chemoreceptor trigger zone - a sense organ or sensory nerve ending that is stimulated by and reacts to certain chemical stimuli and that is located outside the central nervous system. Chemoreceptors are found in the large arteries of the thorax and neck (carotid and aortic bodies), the taste buds, and the olfactory cells of the nose

CHF - congestive heart failure - where the right and left ventricles are too weak to pump the blood into the body and then fluids build up, when the left ventricle is too weak the patient develop a "smothering" feeling (the lungs fill up with fluid), could also experience pain, when the right ventricle is involved, we see swelling of the extremities, especially lower legs and feet

Chloasma - tan to brown, sharply defined patches of skin pigment, usually found symmetrically on the forehead, temples, cheeks or upper lip. The excess pigmentation often occurs in pregnant women, in women using oral contraceptives, or in patients with underlying liver disease. Women are more often affected than men. Sun exposure tends to worsen the condition

Cholelithiasis - formation or presence of stones in the bladder or kidneys or bile-stones in the gallbladder or common duct

Cholestatic - arrest of the flow of bile. This may be due to intrahepatic causes, obstruction of the bile duct by gallstones, or any process that blocks the bile duct

Cholesterol - a sterol widely distributed in animal tissues. Found in egg yolks, various oils, fats, myelin in the brain, spinal cord and axons, liver, kidneys, and adrenal glands. It is synthesized in the liver and is a normal constituent of most gallstones and of atherosclerotic plaques found in arteries. It is important in metabolism. An elevated blood level of cholesterol increases a person's risks of developing coronary heart disease (CHD). Lowering elevated levels of total blood cholesterol and the levels of low density lipo protein cholesterol, reduces the risk of heart attacks, both in persons with a prior history of coronary disease and in asymptomatic individuals

Choreiform - of the nature of chorea which is any involuntary dancing or writhing of the limbs or facial muscles

Choreoathetosis - a nervous affection marked by muscular twitching slow repeated, involuntary, worm like movements, purposeless, muscular distortion involving part of a limb, toes, fingers or almost the entire body

Chromomycosis - a chronic fungal skin infection marked by itching and warty plaques on the skin and subcutaneous swellings of the feet, legs, and other exposed areas
Chronic obstructive pulmonary disease (COPD), a group of debilitating and progressive and potentially fatal lung diseases that have in common increased resistance to air movement, prolongation of the expiratory phase of respiration, and loss of the normal elasticity of the lung.

Circadian - Pertaining to events that occur at approximately 24 hour intervals, such as certain physiological phenomena.

Circulatory collapse - failure of the cardiovascular system to provide bodily tissues with an adequate amount of blood for proper functioning, it may be due to heart (cardiac) failure or peripheral circulatory failure, as occurs in shock in which there is loss of blood plasma into the tissues with resulting venous return.

Cirrhosis - a chronic liver disease characterized pathologically by liver scarring with loss of normal hepatic architecture and areas of effective regeneration. Clinical symptoms of the disease result from loss of functioning liver cells and increased resistance to blood flow through the liver (portal hypertension).

CK or CPK level - an enzyme that catalyzes the reversible transfer of high energy phosphate between creatine and phosphocreatine and between adenosine diphosphate (ADP) and adenosine triphosphate (ATP). Different isoforms predominate in different tissues skeletal muscle (CK-MM), cardiac muscle (CK-MB), and in the brain (CK-BB), aiding in differential diagnosis of conditions in which this enzyme is present in the bloodstream. The serum level of CK-MB may be increased 10 to 25 times the normal in the first 10 to 14 hours after a myocardial infarction (heart attack) and return to normal within 2 to 4 days, provided that no further heart muscle necrosis (damage) occurs.

Clammy - perfuse sweating and cool.

Clonic - pertaining to alteration of contraction and relaxation of muscles.

CNS - central nervous system - brain and spinal cord, including their nerves and end organs, controlling voluntary acts, also called cerebrospinal system and voluntary nervous system, composed of nerve tissue called the gray and white matter.

Coccidioidomycosis - infection with a pathogenic fungus found in the soil. Spores from the fungus circulate in the air, when the dirt is disturbed during construction, dust storms, or earthquakes. Persons who inhale the spores may develop active or subclinical infection. About 80% of those persons living in the southwest and western states have positive skin test, which identify those infected. Usually these infections are asymptomatic and require no treatment.

Cogwheel rigidity - an abnormal rigor in muscle tissue, characterized by jerky movements when the muscle is passively stretched. Some authorities believe
cogwheel rigidity masks a muscular tremor that is not evident until the affected muscle is manipulated

**Colic** - spasm in any hollow or tubular soft organ accompanied by pain

**Colon** - the large intestine, bowel

**Colostomy** - an incision of the abdomen and colon for the purpose of making a more or less permanent stoma (opening) on the abdominal area for bowel movements generally for treatment of cancer or diverticulitis

**Comatose** - an abnormal deep stupor occurring in illness or as a result of it, or may be due to an injury, treatment strictly limited, may slightly raise head

**Concomitantly** - accessory, taking place at the same time

**Congenital** - present at birth

**Conjunctivitis** - inflammation of the mucous membrane, which lines the eyelids and is reflected onto the eyeball

**Contractibility** - having the ability to shorten, draw, squeeze together or reduce in size, as in heart muscle needs the contractibility to pump blood into the arterial system

**Convulsion** - a sudden periodic attack or recurrence of symptoms of a disease, of involuntary muscular contractions and relaxations generally in children called seizures

**Cornea** - clear transparent anterior portion of the fibrous coat of the eye comprising about one sixth of its surface

**Coronary** - a term applied to the blood vessels of the heart which supply blood to its walls, coronary pain is a dull heavy one, like a vise

**Coronary insufficiency** - obstruction to the flow of blood through the coronary arteries, resulting in the inadequate supply of blood relative to the metabolic demands of the heart muscle

**Cortex** - the outer layer of an organ as distinguished from the inner medulla

**Cortical** - the outer layer of an organ as distinguished from the inner medulla as in the adrenal gland, kidney, ovary, lymph node, thymus, and cerebrum and cerebellum in the brain, outer layer of the eye

**Corticosteroids** - any of a number of steroid substances obtained from the cortex of the adrenal gland used to decrease swelling in joints, for example

**CPR** - **cardio pulmonary resuscitation**: act of bringing one back to full consciousness, or restarting the heart and or respirations

**Creatinine** - end product of creatinine metabolism, it is a constituent of blood and increased quantities of it are found in advanced renal disease

**Cryptococcus** - a genus of pathogenic yeastlike fungi
CT - CAT scan - Computerized Tomography - an enhanced xray where the patient is in a tunnel like machine that makes pictures or slices of the area being xrayed

Curare - a paralytic drug, derived from natural plant resins that is used by South American hunters to immobilize prey. Synthetic derivatives of this agent are used medicinally to relax skeletal muscles during anesthesia and critical care

Cyanosis - slightly bluish, grayish, slate like or dark purple discoloration of the skin due to presence of abnormal amounts of reduced hemoglobin in the blood

Cycloplegia - paralysis of the ciliary muscle (eye). This can be an anticholenergic side effect of antipsychotic or antidepressant medications

Cyst - a closed sac or pouch with a definite wall, which contains fluid, semi fluid or solid material, usually an abnormal structure resulting from developmental anomalies, obstruction of ducts, or parasitic infection, usually not cancerous

Cystic Fibrosis - a potentially fatal autosomal recessive disease that manifests itself in multiple body systems including the lungs, the pancreas, the urogenital system, the skeleton, and the skin; it causes chronic obstructive pulmonary obstructive disease, frequent lung infections, deficient elaboration of pancreatic enzymes, osteoporosis, and an abnormal high electrolyte concentration in sweat. CF begins in infancy and is the major cause of severe cause of lung disease in children

Cystitis - inflammation of the bladder usually occurring secondary to infections of associated organs (kidneys, prostate, urethra)

Cytochrome - an iron, containing protein found in the mitochondria of eukaryotic cells; each is given a letter name (a, b, c,). The cytochrome transport system (electron transport chain) is the last stage in aerobic cell respiration

D

D5W, D545, RL, Saline - all are IV solutions to mix medications with, but must be careful what to mix with what due to incompatibilities

Danthron - a stimulant laxative

Deanol - a central nervous system stimulant

Dehydration - the process of dehydrating, occurs when output of water exceeds water intake, may result from deprivation of water, excessive loss of water, reduction in total quantity of electrolytes or injection of hypertonic solutions

Delirium - disorientation for time and place, usually with illusions and hallucinations, a state of mental confusion and excitement, the mind wanders, the speech is incoherent, and the patient is in a continual state, aimless physical activity, there are many forms of delirium depending on the cause
**Delirious tremors** - the most severe expression of alcohol withdrawal syndrome, marked by visual, auditory, or tactile hallucinations, extreme disorientation, restlessness, and hyperactivity of the autonomic nervous system

**Delusions** - a false belief, differs from hallucinations which involves the false excitation of one or more of the senses, most important delusions: those which cause the patient to harm others, or himself, such as fear of being poisoned, causing the patient to refuse food, those leading to suicide or inflicting injury upon himself, false beliefs such as having been guilty of an unpardonable sin, those of persecution

**Dementia** - irrecoverable deterioration mental state, the common end result of many entities

**Dermatitis** - inflammation of the skin evidenced by itching, redness and various skin lesions

**Dermatophytosis** - athlete’s foot

**Despondence** - looking very depressed, quiet, reserved, showing no emotion

**Dextromphetamine** - it is used as a central nervous system stimulant in attention deficit hyperactivity disorder (ADHD) and occasionally as a treatment for depression in patients with terminal patients. Prolonged use can cause psychological dependence. The street name for this is “speed”

**Diabetes Mellitus** - a chronic metabolic disease marked by hyperglycemia (high sugar level). Diabetes results either from failure of the pancreas to produce insulin (type I Diabetes) or from insulin resistance, with inadequate insulin secretion to sustain normal metabolism (type 2 Diabetes). Either type of Diabetes may damage blood vessels, nerves, kidneys, and the retina, and in pregnancy, the fetus

**Diaphoresis** - profuse sweating, possibly an agent causing the increase

**Dilatation** - expansion of an organ or vessel or enlargement of

**Diplopia** - double vision

**Distention** - the state of being distended or stretched as in the abdomen

**Diuretic** - increasing or an agent, which increases the secretion of urine

**Diverticulitis** - inflammation of the diverticulum of the colon causing stagnation of stool in little distended sacs of the colon called diverticula

**DNA** - deoxyribonucleic acid, a complex protein of high molecular weight present in the chromosome of the nuclei of the cells and is considered the chemical basis of heredity and the carrier of genetic information

**Dopamine** - a vaso-pressor to keep the blood pressure up, also used in congestive heart failure, pulmonary edema to enhance diuresis
Duodenitis – inflammation of the duodenum – the first part of the small intestine connecting with the pylorus of the stomach and extending to the jejunum
Dysarthria – difficulty in articulation of joints, difficulty in standing because of lack of coordination or because of muscular tremors, in correctly applied to imperfect speech, stammering
Dyscrasia – any morbid condition supposed to be caused by toxins in the blood
Dysgeusia – impairment or perversion of the gustatory sense so that normal tastes are interpreted as being unpleasant or completely different from the characteristic taste of a particular food or chemical compound
Dysmenorrhea – painful or difficult menstruation, either primary or secondary
Dyskinesia – a defect in the ability to perform voluntary movement
Dysmenorrhea – pain in association with menstruation. One of the most frequent gynecological disorders. It is the greatest single cause of absence from school and work among menstrual-age women
Dysmetria – an inability to fix the range of a movement, rapid and brisk movements made with more force than necessary, seen in cerebellar affections
Dysostosis – defective bone formation
Dyspepsia – Imperfect digestion, not a disease in itself, but symptomatic of other diseases or disorders, indigestion
Dysphagia – inability or difficulty in swallowing, impairment of speech resulting from a brain tumor
Dysphonic – difficulty in speaking, hoarseness
Dysphoric – exaggerated feeling of depression and unrest without apparent cause
Dyspnea – air hunger resulting in labored or difficult breathing usually accompanied by pain, insufficient oxygenation of the blood resulting from disturbances in the lungs, low oxygen pressure in the air, circulatory disturbances, hemoglobin deficiencies, acidosis, excessive sodium bicarbonate content of the blood, excessive muscular activity, lesions of the respiratory center, emotional excitation, asthma
Dysrhythmia – irregular possibly painful heart rhythm due to a variety of reasons
Dystonia – not having the ability to possess muscular tone or unable to have a state of normal tension or partial contraction of muscle fibers while at rest
Dysuria – painful or difficult urination, symptomatic of numerous conditions, usually frequent urination, may be indicative of cystitis, neuralgia of the bladder, urethritis, ulcerated prostate in the male or prolapsed uterus in the female, pelvic peritonitis and abscess, pain and burning may also be caused by concentrated acid urine
Ecchymosis - when blood leaks into the skin or mucous membrane, due to injury, clotting mechanism problems, etc. The skin becomes blue-black to greenish-brown to yellow in color.

Eczema - cutaneous inflammatory condition, acute or chronic with varied rashes.

Edema - a condition, in which the body tissues contain an excessive amount of tissue fluid, may be local or general, generalized edema is called dropsy or anasarca.

EEG - an instrument for recording electrical fluctuations of the brain after amplification of more than a billion times.

Efflux - an outflowing of fluid.

EKG - electrocardiogram - a typical record of the normal heart tracing showing specific waves - P, Q, R, S, T, and the electrical makeup of the heart.

Electroconvulsive therapy - the induction of a brief seizure by passing an electric current through the brain for the treatment of affective disorders, especially in patients resistant to psychoactive drug therapy. The patient loses consciousness and undergoes tonic contractions for approximately 10 seconds, followed by a somewhat longer period of clonic seizures accompanied by apnea; on awakening the patient has no memory of the shock. ECT is usually administered three times a week for 2 months and is used primarily for the treatment of acute depression.

Electrolytes - a solution that conducts electricity; a substance that, in solution conducts an electrical current and is decomposed by its passage. Acids, bases, and salts are common electrolytes.

Electrolyte imbalance - a condition of a solution needed for conduction of electricity for an electric current that is not balanced within the "normal" ranges causing a wide variety of other health problems, usually think of sodium, potassium, calcium, magnesium, etc.

Electron microscopy - a specific test used in the diagnoses of Batten Disease.

Embolism - obstruction of a blood vessel by foreign substance or a blood clot, diagnosing depends on the factors predisposing arteriosclerosis favors a thrombosis while atrial fibrillation, bacterial endocarditis, or thrombophlebitis points to embolism, nearly always embolism is due to blood clots.

Emulsion - a mixture of two liquids not mutually soluble. If they are thoroughly shaken, one divides into globules in what is called the discontinuing or dispersed phase; the other is then the continuous phase. Milk is an emulsion in which butterfat is the discontinuous phase.

Endometriosis - tissues located in various sites throughout the pelvis or in the abdominal wall, found more commonly in the ovary than elsewhere.
Endotracheal - within or through the trachea
Emesis - vomiting
Emetic - medicines that produce vomiting
Empiric - a practitioner whose skill or art is based on what has been learned through experience
Emphysema - distention of tissues by air or gas in between the cells of the lung, a condition in which the alveoli of the lungs become distended or ruptured, usually the result of interference with expiration, or loss of elasticity of the lung
Encephalin - a pentapeptide produced in the brain. It acts as an opiate and produces analgesia by binding to opiate receptor sites involved in pain perception. The threshold for pain is therefore increased by this action. Encephalin may have a role in explaining the withdrawal signs of narcotic addiction
Encephalopathy - disease of the brain
Endocrine - an internal secretion, pertaining to a gland that produces secretion
Endogenous - produced within a cell or organism, concerning spore formation within the bacterial cell
Endorphins - a polypeptide produced in the brain that acts as an opiate and produces analgesia by binding to the opiate receptor sites involved in pain perception. The threshold for pain is therefore increased by this action. The most active of these compounds is beta-endorphin
Endoscopy - inspection of the cavities by use of the esophagus and the endoscope
Enteritis - inflammation of the intestines, more particularly of the mucous and sub-mucous tissues usually of the small intestine
Enuresis - incontinence, involuntary discharge of urine, complete or partial, diurnal or nocturnal, dependent upon pathologic or functional causes, although it may be voluntary as representative of a behavior pattern
Enzymes - an organic catalyst produced by living cells but capable of acting independently of the cells producing them, they are complex substances which are capable of inducing chemical changes in other substances without themselves being changed in the process, protein in nature, found in the digestive juices acting upon food substances causing them to break down into simpler compounds, they are capable of accelerating greatly the speed of chemical reactions
Eosinophil - a cell or cellular structure that stains readily with the acid stain, present in small numbers in normal conditions
Epidermophyton floccosum - the causative agent of certain types of athlete’s foot
Epidural - located over or upon the dura which is the space outside the dura mater of the brain and spinal cord
Epigastric - condition of the upper portion of the abdominal muscle of the stomach when skin of the epigastric region is scratched.

Epilepticus - continual grand mal seizures where immediate medical attention is required.

Epinephrine - the active principle of the medulla of the adrenal gland, occurring as a white or light brown powder, darkening on exposure to the air, it has been prepared synthetically, it is employed therapeutically as a vasoconstrictor, cardiac stimulant, to induce uterine contractions and to relax bronchioles, its effects are similar to those brought about by stimulation of the sympathetic division of the autonomic nervous system.

Epistaxis - nosebleed.

Eradication - laying open diseased part and scraping away diseased tissue.

Ergosterol - the primary sterol, or fat found in the cell membranes of fungi. It plays a role similar to that of cholesterol in human cell walls. Most antifungal drugs act on ergosterol to increase permeability of the cell wall of the fungus, promoting its destruction.

Eructation - producing gas from the stomach, usually with a characteristic sound; belching.

Erythema - a form of rash showing diffused redness over the skin, caused by capillary congestion, usually due to dilatation of the superficial capillaries as a result of some nervous mechanism within the body, inflammation, as a result of some external influence such as heat, sunburn etc.

Esophagitis - inflammation of the esophagus.

Estrogens - any natural or artificial substance that induces estrus and the development of female sex characteristics; more specifically, the estrogenic hormones produced by the ovary; the female sex hormones. Estrogens are responsible for cyclic changes in the vaginal epithelium and endometrium of the uterus.

ET tube - endotracheal tube - inserted by a physician or EMT during a crisis situation to maintain the heart and lungs, seen as a heroic measure.

Euphoria - a condition of good health, a feeling of wellbeing, mild elation.

Exacerbation - aggravation of symptoms or increase in the severity of a disease.

Excretion - the elimination of waste products from the body.

Exfoliative - the shedding or casting off of a body surface (the outer body layer of skin cells. The outer table of bone, the primary set of teeth).

Exogenous - originating outside an organ or part.

Extra-pyramidal - adverse side effects with many of the anticonvulsant, and anti-anxiety drugs given to batten children - see specific drug for exact side effects.
Extravasation - the escape of fluid from its physiologic contained space like bile, blood, cerebrospinal fluid (CSF), into the surrounding tissue

Fatty acid - any of several organic acids produced by the hydrolysis of neutral fats. In a living cell a fatty acid occurs in combination with another molecule rather than in a free state. Essential fatty acids are unsaturated molecules that cannot be produced by the body and must therefore be included in the diet. Kinds of essential fatty acids are arachidonic, linoleic, linolenic

FDA - Food and Drug Administration, which approves or disapproves new and drugs that, are already being used

Fecal - stool, body waste

Fibrillation - quivering of muscle fibers, tremor or rapid action of the heart

Fibrosis - the repair and replacement of inflamed tissues or organs by connective tissues. The process results in the replacement of normal cells by fibroblasts and eventually, the replacement of normal organ tissue by scar tissue

Flatulence - excessive gas in the stomach and intestines

Fluid retention - failure of the body to expel fluids normally, occurring in kidney diseases, when the protein count of plasma falls below 4%, fluid cannot be attracted back into the blood stream and edema (swelling) occurs, retention of salt is another cause of fluid retention

Fluorometer - a device for determining the amount of radiation produced by xrays. A device for adjusting a fluoroscope to establish the location of a target more accurately and to produce an undistorted image or shadow

Focal - pertaining to the point of convergence of light rays or waves of sound, such as a focal infection is one occurring near a focus - as the cavity of a tooth

Folliculitis - inflammation of a follicle, synonym would be acne, or inflammation of a puss filled follicle of the scalp resulting in irregular hair loss and scarring

Fungi - a vegetable cellular organism that subsists on organic matter, such as bacteria and molds, many species are parasitic, thus disease, fungi are simple dependent plants, lacking chlorophyll, with simple life cycles including toadstools, molds, mushrooms, rusts, lichens, and yeasts

Furunculosis - a condition resulting from furuncles or boils - a tender dome shaped skin lesion, typically caused by infection around a hair follicle with Staph aureus. Boils usually appear on the neck, face, axilla, or buttocks. When they first appear they are often superficial, but as they mature they form localized abscesses with
pus and necrotic debris at their core. On rare occasions they spread to deeper tissues, sometimes with tragic consequences (spreading to the brain or meninges)

\[G\]

**GABA** – gamma aminobutyric acid - the brain's principal inhibitory neurotransmitter

**Gamma glutamyl transferase (GGT)** - a liver enzyme that is very sensitive in detecting early liver damage, obstruction or alcohol-induced liver disease; it’s usually measured with other enzymes to confirm hepatic disease

**Gastric** – pertaining to the stomach

**Gastritis** - inflammation of the stomach, characterized by epigastric pain, tenderness, thirst, nausea, vomiting and diarrhea

**Gastroenteritis** - inflammation of the stomach and intestines usually called the flu

**GERD** - gastric esophageal reflux disease

**GI** – gastro-intestinal tract - includes mouth, esophagus, stomach, small intestine, and large intestine

**Gingival hyperplasia** - overgrowth of the soft tissue of the gums, often seen in patients treated with Dilantin (Phenytoin) for epileptic seizures

**Gingivitis** - inflammation of the gums characterized by redness, swelling and tendency to bleed

**Ginkgo biloba** - a deciduous gymnosperm tree with fan-shaped leaves and spherical cones. Its extracts have been used medicinally in China for centuries and promoted as a memory aid. Its extracts and metabolites are antioxidants

**Glandular** - pertaining to or the nature of the gland, treatment of the disease with endocrine glands of their extracts

**Glaucoma** - disease of the eye characterized by an increase in the intraocular pressure which results in atrophy of the optic nerve and blindness of two general types, primary which sets in without known cause, and secondary in which there is an increase in intra-ocular pressure due to other eye diseases, the acute type is accompanied by acute pain, the chronic type has an insidious

**Gliomas** - an onset

**Glioma** - a sarcoma (cancerous) of neurological origin; a neoplasm or tumor composed of neuroglia cells

**Glossitis** - inflammation of the tongue

**Glutamate** - a salt of glutamic acid that functions as the brain's main excitatory neurotransmitter
Glycerol - a trihydric alcohol, present in chemical combination in all fats. It is a syrupy colorless liquid, soluble in all proportions in water and alcohol. It is made commercially by the hydrolysis of fats, especially during the manufacture of soap, and is used extensively as a solvent, a preservative, and an emollient in various skin diseases. Given orally, it reduces intracranial pressure and preoperatively, reduces intraocular pressure in glaucoma.

Glycosuria - the presence of sugar in the urine.

Goiter - an enlargement of the thyroid gland, may be due to a lack of iodine in the diet, thyroiditis, or inflammation from infection to tumors to hypo-hyper function of the thyroid gland.

Gonadotrophin - a gonad stimulating hormone referring to both male and female sex hormones.

Grand mal seizure - tonic clonic seizure, a typical epileptic attack with or without coma.

GROD's - granule osmophilic deposits found in the infantile form of Batten Disease.

GU - genital urinary system.

Gynecomastia - abnormally large mammary glands in the male, sometimes may secrete milk.

Halitosis - bad breathe, offensive breath.

Hallucinations - false perception having no relation to reality and not accounted for by any external stimuli, commonly, the patient is unable to consider it as not constituting reality but judgment may at times recognize discrepancies, and even at times deny the hallucination entirely, usually then, the patient reacts emotionally and behave as one would to a real situation.

Hematocrit - an obsolete term for a centrifuge for separating solids from plasma in the blood. The volume of erythrocytes (Red blood cells) packed by centrifuge in a given volume of blood. The hematocrit is expressed as the percentage of total blood volume that consists of RBC's or as the volume in cubic centimeters of RBC's packed by centrifugation of blood.

Hematopoietic - pertaining to the production and development of blood cells. A substance that assists in or stimulates the production of blood cells.

Hematotoxicity - pertaining to septicemia or toxicity in the blood.

Hematuria - blood in the urine, urine may be slightly smokey, reddish or very red.

Hemianopia - blindness for one-half field of vision in one or both eyes.
Hemiplegia - paralysis of only one half of the body, a brain lesion involving upper motor neurons and resulting in paralysis of the opposite side of the body

Hemodialysis - process by which the blood is filtered through a machine when the body is unable to rid itself of natural body toxins for whatever reason

Hemodynamics - a study of the forces involved in circulating blood through the body

Hemoglobin - the iron containing pigment of red blood cells that carries oxygen from the lungs to the tissues

Hemolytic anemia - pertaining to the breakdown of red blood cells to the point of being anemic

Hemoptysis - expectoration (vomiting) of blood arising from hemorrhage of the larynx, trachea, bronchi, or lungs, attack sudden, salty taste, blood frothy, bright red

Hemorrhage - abnormal discharge of blood, either external or internal, venous, arterial, or capillary from blood vessels into tissues into or from the body, venous blood is dark red, flow is continuous, arterial blood is bright red, flows in jets, capillary blood is of a reddish color, exudes from tissues

Hepatic - pertaining to the liver

Hepatitis - inflammation of the liver, virus, toxic origin, it is manifested by jaundice (yellowing of the skin or the whites of the eyes) and in some instances, liver enlargement, fewer and other systemic disorders are usually present

Hepatobiliary - a combining word referring to the liver and the bile ducts

Hepatocellular - pertaining to the cells of the liver

Hepatomegaly - enlargement of the liver

Herpes simplex - fever blisters, occurrence of clusters of blisters usually on the face (also may be on the genital area) marked by itching and localized pain, lesions will dry up in 10 - 14 days if left alone

Hiatal hernia - protrusion of a portion of the stomach upward through the diaphragm. The condition occurs in about 40% of the population and most people display few, if any, symptoms. The major difficulty in symptomatic patients is gastro esophageal reflux, the backflow of acid contents of the stomach into the esophagus

Hirsutism - condition characterized by excessive growth of hair or presence of hair in unusual places

Histaminergic/histamine - a substance produced from the amino acid histidine, which causes dilation of blood vessels, increased secretion of acid by the stomach, smooth muscle constriction (in the bronchi), and mucus production, tissue swelling,
and itching (during allergic reactions) The release of histamine from mast cells is a major component of hypersensitivity reactions, including asthma

**Histoplasmosis** - a systemic fungal, respiratory disease caused by *Histoplasma capsulatum*. The reservoir for this fungus is in soil with a high organic content and undisturbed bird droppings, especially that around old chicken houses, caves harboring bats, and starlings, blackbirds, and pigeon roosts. Disseminating histoplasmosis is a common opportunistic infection in patients with AIDS and other immunosuppressed illnesses

**Hydrolysis** - any reaction in which water is one of the reagents, more specifically the combination of water with a salt to produce an acid and a base, one of which is more dissociated than the other. It involves a chemical decomposition in which a substance is split into simpler compounds by the addition or the taking up of the elements of water. This kind of reaction occurs extremely frequently in life processes

**Hydroxycorticosteroid** - a powerful steroid that helps in the inflammation within the body during an episode of illness

**Hyperammonemia** - an excess amount of ammonia in the blood or ammonia toxicity. Ammonia is produced in the intestinal tract by bacterial action

**Hyperbilirubinemia** - an excessive amount of bilirubin in the blood. The condition is seen in any illness causing jaundice (yellowing of the skin or whites of the eyes), including diseases in which the biliary tree is obstructed, and those in which blood formation is ineffective

**Hypercalcemia** - an excessive amount of calcium in the blood. The causes of this condition include primary hyperparathyroidism, Lithium therapy, cancers including solid tumors, Vitamin D intoxication, hyperthyroidism, Vitamin A intoxication, aluminum intoxication and milk-alkali syndrome

**Hypercapnea** - an increased amount of carbon dioxide in the blood. Elevated levels of carbon dioxide in the blood result from inadequate ventilation or from massive mismatches between ventilation and perfusion and the blood. Some of the common symptoms are: dizziness, drowsiness, confusion, tremors, and twitching

**Hyperchloremia** - an increase in the chloride content of the blood. Chloride is the major extracellular anion and contributes too many body functions including the maintenance of osmotic pressure, acid-base balance, muscular activity and the movement of water between fluid compartments. It is associated with sodium in the blood and was the first electrolyte to be routinely measured in the blood

**Hyperesthesia** - increased lack or loss of strength, debility, any weakness, but one especially originating in muscular or cerebellar disease
Hyperglycemia - increase of blood sugar of up to 3% or more, like in diabetes, this condition increases susceptibility to infection and it often precedes diabetic coma
Hyperkinesia - excessive amount of mobility
Hyperlipidemia - an increase of lipids (fats) in the blood
Hyperplasia - an increase in the size of a tissue or organ resulting from proliferation of cells or the development of additional tissue of which the organ is composed but excluding tumor formation, excessive formation of tissue
Hyperpyrexia - elevation of systemic temperature above 106 degrees
Hyperreflexia - increased action of the reflexes
Hypersecretory - abnormally high amount of secretions
Hypersynchronization - highly moving or operating at the same rate; occurring or existing at the same time
Hypertension - tension or tone above normal, a condition in which the patient has a higher blood pressure than normal for his age, an increase in peripheral resistance resulting from vasoconstriction or narrowing of peripheral blood vessels, a blood pressure of 160 constitutes the beginning of high blood pressure which may run well above 200 - 280 range, persistent high blood pressure may result in apoplexy (a sudden loss of consciousness) followed by paralysis due to hemorrhage into the brain or spinal cord or formation of an embolus or thrombosis or heart failure
Hyperthermia - unusually high fever, treatment of disease by raising bodily temperature, accomplished by introduction of the malaria organism, injection of foreign proteins, or by physical means
Hyperthyroidism - a condition caused by excessive secretions of the thyroid glands which over-stimulates the basal metabolism, causing an increased demand for food to prevent oxidation of body tissues, it may take two forms, a goiter (Graves disease) and toxic adenoma
Hypertonia - increased tension, as muscular tension in a spasm
Hypertrichosis - an excessive growth of hair, possibly caused by endocrine disease, especially of the adrenal gland and in women, disease of the ovary
Hypertriglycerideremia - an increased blood triglyceride (sources of energy or stored as fat) level; a possible risk factor for cardiovascular disease (heart issues)
Hypertrophy - increase of size in an organ or structure which does not involve tumor formation, term is generally restricted to an increase in size or bulk not resulting from an increase in number of cells or tissue elements as in the hypertrophy of a muscle
Hyperventilation - increased minute volume ventilation, which result in a lowered carbon dioxide (CO2) level (hypocapnia). It is a frequent finding in many disease processes such as asthma, metabolic acidosis, pulmonary embolism, and pulmonary
edema, and also in anxiety-induced states. Treatment is directed at the underlying cause. Immediate therapy in panic attacks consists of coaching the patient to slow down the breathing process to decrease the rate of blowing off CO2. One way to do this is to have the patient breathe through only one nostril, with the mouth closed. Having the patient breathe in and out of a paper bag is discouraged, as it leads to hypoxemia. After the acute phase of the hyperventilation has been managed, the underlying cause of the problem must be determined.

**Hypnotic** – pertaining to sleep or hypnosis, an agent which induces sleep or which dulls the senses, drugs which cause insensibility to pain by inhibiting afferent impulses or the central centers of the brain receiving sensory impressions, and thus causing partial or complete unconsciousness

**Hypochondriac** – affected with a morbid interest in health and disease

**Hypoglycemia** – deficiency of sugar in the blood, a condition in which there is a level less than 80, hyper function of the pancreas may cause it or injection of an excessive amount of insulin

**Hypokalemia** – an abnormally low concentration of potassium in the blood

**Hypokinesia** – decreased motor reactions to stimulus

**Hypomania** – hypomania and excitement, with a moderate change in behavior

**Hyponatremia** – a decreased concentration of sodium (salt) in the blood

**Hypophysis** – the pituitary body or gland

**Hypotension** – decrease of systolic and diastolic blood pressure below normal, deficiency in tone or tension, below a blood pressure of 90/50 is pathologic, if increased pressure is followed by decreased pressure can be a serious condition, if the systolic and the diastolic drops proportionately – the patient will respond to the administration of stimulants, hypotension causes an accumulation of blood in the veins and slows down the arterial current

**Hypothalamic** – a portion of the diencephalons compromising the ventral wall of the third ventricle below the hypothalamic sulcus, source of the hormones vasopressin and oxytocin stored and released by the neural lobe of the hypophysis

**Hypothermia** – having a body temperature below normal, an art of lowered body temperature, usually between 78 - 90 degrees, to reduce oxygen need during surgery (especially cardiovascular and neurological procedures) and in hypoxia, to reduce blood pressure and to remedy

**Hypothyroid** – marked by insufficient thyroid secretions in the body resulting in diminished basal metabolism, intolerance of cold temperatures, fatigue, mental apathy, physical sluggishness, constipation, muscle aches, dry skin and hair, and coarsening of features. These symptoms are called myxedema
Hypotonia – reduced tension, relaxation of arteries, loss of tone of the muscles or intra-ocular pressure

Hypoventilation – reduced rate and depth of breathing

Hypovolemia – diminished blood supply

Hypoxemia – decreased oxygen tension (concentration) in arterial blood, measured by arterial oxygen partial pressure (PaO2) values. It is sometimes associated with decreased oxygen content

Hypoxia – lack of an adequate amount of oxygen in inspired air such as occurs in high altitudes, reduced oxygen content or tension

Hysteria – a condition presenting somatic symptoms, stimulating almost every type of physical disease and a series of mental manifestations, mental attitude is calm, there is not unfriendly aloofness, but psychotic indifference is quite another matter – laughing, crying, episodes of emotions without any apparent explanation, and even occurring in sleep

Ileostomy – creation of a surgical passage from the small intestine to the outside of the abdomen – stool usually much thinner than with a colostomy

IM, IV, Subcutaneous – are all routes for medications

Immunocompromised – having an immune system that is incapable of a normal, full reaction to pathogens or tissue damage, as a result of a disease like diabetes, overwhelming sepsis, or AIDS or drug therapy with agents that inhibit components of the immune system

Immunosuppressant – prevention of the activation of immune responses

Incontinence – inability to remain urine or stool through loss of sphincter control

Increased intracranial pressure – usually fluid builds up inside the brain causing increased pressure, caused by things like tumors, trauma/injury or stroke. Symptoms may include memory issues, balance, ambulation, depending which area of the brain is affected

Infiltrates – to pass into or through a substance or a space. The material that has been infiltrated. A shadow seen on a chest xray, and assumed to represent blood, pus, or other body fluids in the lung

Influenza – an acute contagious respiratory infection marked by fevers, muscle aches, headaches, prostration, cough, and sore throat. The disease usually strikes during the winter

Influx – a flowing in
**Insomnia** - chronic inability to sleep or sleep prematurely ended or interrupted by periods of wakefulness, may be caused by a heavy late meal, with some coffee or other stimulants, including sugar in any form, overtiredness, mental fatigue, worry, excitement, and principally the fear of being unable to sleep

**Interstitial** - placed or lying between; pertaining to interstices or spaces within an organ or tissue

**Intestinal atony** - lack of muscle tone in the intestine and failure to contract normally, causing a delay in movement of fecal debris to exit the intestine

**Intracellular** - within the cell

**Intracerebral** - within the cerebellum of the brain. The cerebellum is the largest portion of the brain. It lies dorsal to the pons and medulla oblongata, overhanging the latter. It consists of two lateral hemispheres and a narrow middle portion called the vermis. The cerebellum is involved in synergic control of skeletal muscles and plays an important role in the coordination of voluntary movements. It receives afferent impulses but is not a reflex center in the usual sense; however, it may reinforce some reflexes and inhibit others. Although the cerebellum does not initiate movements, it interrelates with many brainstem structures in executing various movements, including maintaining proper posture and balance; walking and running; fine involuntary movements as required in writing, dressing, eating, and playing musical instruments; and smooth tracking movements of the eyes. The cerebellum controls the property of movement such as speed, acceleration, and trajectory

**Intraocular pressure** - pressure within the eyeball

**Intrathecal** - within the spinal canal; within a sheath

**Involutional** - a rolling or turning inward - associated with senile, pre-senile types, and manic-depressive groups

**Iritis** - inflammation of the iris of the eye associated with pain, lacrimation, photophobia, diminution of vision, the iris appears swollen, dull and muddy, and pupil is contracted, irregular and sluggish in reaction

**Irritable bowel** - the way the bowel responds excessively to a stimulus - diarrhea may be increased

**Ischemia** - a temporary deficiency of blood flow to any organ or tissue. The deficiency may be caused by diminished blood flow either through a regional artery or throughout the circulation
Jaundice - a condition characterized by yellowness of the skin, white of eyes, mucus membranes and body fluids, due to deposition of bile pigments resulting from excess bilirubin in the blood, it may result from obstruction of bile passageways, excessive destruction of red blood cells, or disturbances in functioning of the liver cells.

Keratitis - inflammation and ulceration of the cornea, which is usually associated with decreased visual acuity. Eye pain, tearing, and light sensitivity are the most common symptoms.

Ketogenic diet - diet is high in fat, adequate in protein, and has negligible amounts of carbohydrate. It was created to stimulate some of the metabolic effects of fasting, a state known to decrease seizures in some individuals. Usually the child is hospitalized to get them started on the diet. The child fasts for the first few days to get them to a state of ketosis. Many children with Batten Disease have tried the diet. They seem to do well for 2 or 3 months, then the seizures begin to start in again. Some feel it is worth a try. It is an individual decision for your child.

Ketones - normal metabolic products, B-hydroxybutyric acid and aminoacetic acid, from which acetone may arise spontaneously. The two acids are products of lipid pyruvate metabolism, and are oxidized by the muscles. Excessive production of these bodies leads to their excretion in the urine, as in diabetes.

Kyphoscoliosis - lateral curvature of the spine accompanying an anteroposterior hump.

Lability - state of being unstable or changeable, mood swings from depression to euphoria.

Lacrimation - secretion and discharge of tears from the eyes.

Lactic dehydrogenase (LDH) - an enzyme present in various tissues and serum that is important in catalyzing the oxidation of lactate. When tissues have been damaged, say the heart muscle, LDH is released into the blood stream to help eat away the damaged material, therefore, depending on how high the LDH is, can help
determine how severe the heart damage has been along with other enzymes like CPK as well

**Lactulose** - a synthetic product not metabolized or absorbed by humans. It is metabolized by bacteria in the colon with the production of organic acids and is used to treat constipation and the encephalopathy that develops in patients with advanced cirrhosis of the liver. The unabsorbed sugar produces diarrhea and the acid pH helps to contain ammonia in the feces

**Laryngeal edema** - swelling of the larynx in the throat

**Laryngospasm** - spasm of the larynx in the throat

**Lavage** - washing out of a cavity, example the eye or the abdomen

**Lecithin** - any of a group of phospholipids common in plants and animals. They are found in the liver, nerve tissue, semen, and in smaller amounts in bile and blood. They are essential in the metabolism of fats and are used in the processing of foods, pharmaceuticals products, cosmetics, and inks. Rich dietary sources are soybeans, egg yolk, and corn. Deficiency leads to hepatic and renal disorders, high serum cholesterol levels, atherosclerosis, and arteriosclerosis

**Lennox-Gestaut** - blanket term covering a variety of seizures (atonic drop attacks, complex partial, absence, and occasional tonic clonic) associated with significant delay in motor and intellectual development and does not respond well to drugs

**Lens** - a transparent refractory as in the lens of the eye

**Lethargy** - a condition of functional sluggishness, stupor, a state similar to hypnosis, or the first stage of hypnotism

**Leukocytosis** - an increase in the number of leukocytes in the blood. It occurs most commonly in disease processes involving infection, inflammation, trauma, or stress, but it also can result occasionally from the use of some medications

**Leukopenia** - abnormal decrease of white blood cells usually below 5000. A great number of drugs may cause leucopenia, as can failure of the bone marrow

**Leukorrhea** - a white estrogen related scant/moderate odorless physiological vaginal discharge, normally preceding menarche and occurring during ovulation, during pregnancy, and in response to sexual excitement. Some women note an increased discharge related to oral contraceptive or hormone replacement therapy. Chronic cervicitis and vaginal infections are the most common causes of abnormal genital discharge. Signs of infection include increased discharge, change in color and consistency, odor, vulvar irritation, dysuria, and itching

**Limbic** - the edge or border of a part, the margin

**Lipase** - a fat splitting enzyme found in the blood, pancreatic secretion and tissues
Liposome - the recycling center of the cell where large molecules are broken down into small molecules to be reused kidney shaped organs of lymphoid tissues that lie at intervals along the lymphatic vessels

Lupus Erythematosus - tubercular skin disease, acute or subacute circulatory disorders and trauma predispose, reddish brown soft patches, circumscribed with raised edges and depressed centers which are white and scar like when scales drop off, disease spreads slowly, middle life females are predisposing factors. A chronic autoimmune inflammatory disease involving multiple organ systems and marked by periodic acute episodes. The most characteristic symptom is the butterfly rash over the nose and cheeks. The disease is more prevalent is women of childbearing ages

Lymphadenopathy - disease of the lymph nodes

Lymphocyte - a white blood cell responsible for much of the body’s immune protection. Fewer than 1% are present in the circulating blood; the rest lie in the lymph nodes, spleen, and other lymphoid organs, where they can maximize contact with foreign antigens

Lymph nodes - one of thousands of small kidneyed shaped organs of lymphoid tissue that lie at intervals along the lymphatic vessels

Lysis - the gradual decline of a fever or disease; the opposite of crisis. The death of cells or microorganisms, caused by antibodies, complement, enzymes, or other substances

M

Macrocythemia - condition in which erythrocytes are larger than larger, example in folate or vitamin B12 deficiencies

Malaise - discomfort, uneasiness, indisposition, often indicative of infection

Malassezia - a genus of fungi that infects animals and humans. The organisms are lipophilic. In hospitals, the infection tends to occur in patients receiving lipid (fat) infusions. Infections of the bloodstream result in sepsis

Mania - madness, characterized by excessive excitement, a form of psychosis characterized by exalted feelings, delusions of grandeur, elevation of mood, psychomotor, over activity and overproduction of ideas

Meckel’s diverticulum - a congenital sac or blind pouch sometimes found in the lower portion of the ileum. It represents the persistent proximal end of the yolk stalk. Sometimes it is continued to the umbilicus as a cord or as a tube forming a fistulous opening at the umbilicus. Strangulation may cause intestinal obstruction
**Medulla** - the lower portion of the brain stem in the brain - inner or central portion of an organ

**Megablastic anemia** - a hematologic disorder characterized by the production and peripheral proliferation of immature, large, and dysfunctional erythrocytes. Megablasts are usually associated with severe pernicious anemia or folic acid deficiency anemia

**Melanoma** - a malignant tumor of melanocytes that often begins in a darkly pigmented mole and can metastasize widely. The incidence of melanoma is rising more rapidly than that of any other cancer

**Melasma** - any discoloration of the skin

**Melena** - black vomit, evacuations resembling tar, due to action of the intestinal juices on free blood

**Meningitis** - inflammation of the membranes of the spinal cord or brain, caused by bacteria, viruses, or other organisms which reach the meninges from other points in the body through blood or lymph, through trauma, or from adjacent bony structures (sinuses, mastoid cells)

**Menorrhagia** - excessive bleeding at the time of a menstrual period, either in number of days or amount of blood or both

**Menorrhea** - normal menstruation or free of profuse menstruation

**Metabolic** - the sum of all physical and chemical changes which take place within an organism, all energy and material transformations which occur within living cells, the food we eat is metabolized into fats, proteins, carbohydrates that our bodies need

**Metabolic acidosis** - a condition resulting from excessive absorption of retention of acid or excessive excretion of bicarbonate. In starvation and in uncontrolled diabetes, glucose is not present or is not available for oxidation for cellular nutrition. The plasma bicarbonate of the body is used up in neutralizing the ketones produced by the breakdown of body fat for energy that occurs in compensation for the lack of glucose. Metabolic acidosis also occurs when oxidation takes place without adequate oxygen, as in heart failure or shock. Severe diarrhea, renal failure, and lactic acidosis may also result in metabolic acidosis. Signs of metabolic acidosis include shock, coma, tachypnea, and almond breath odor. Hyperkalemia often accompanies the condition

**Metabolites** - any product of metabolism

**Metabolized** - to alter the characteristics of a food substance biochemically. To break down a compound to its constituents by biological mechanisms
**Methamphetamine** - a sympathomimetic drug used as a stimulant or weight loss promoter. It is a controlled substance that causes euphoria and has a high potential for abuse

**Methylcellulose** - a tasteless powder that becomes swollen and gummy when wet. It is used as a bulk substance in foods and laxatives and as an adhesive or emulsifier

**Methylphenidate hydrochloride** - a drug that is chemically related to amphetamine. It is used in treating narcolepsy and attention deficit disorder

**Microorganisms** - a living organism too small to be perceived with the naked eye, especially a virus, bacterium, fungus, protozoan, or intracellular, parasite, and some helminths

**Micturition** - the voiding of urine

**Miosis** - abnormal contraction of the pupil, period of distinguishing symptoms in a disease, method of cell division which allows each daughter nucleus to receive half the number of chromosomes present in the somatic cell

**Mitochondrial** - cell organelles or rod or oval shape. They can be seen by using phase-contrast or electron microscopy. They contain the enzymes for the aerobic stages of cell respiration and thus are the sites of most ATP synthesis

**Mitogenic** - the production of cell mitosis, which is cell division

**Moniliasis** - infection of the skin or mucous membranes by yeast like fungi, usually localized in skin, nails, mouth, vagina, bronchi, or lungs, but may invade blood stream

**Monoamine Oxidase Inhibitor - MAO** - one member of a group of drugs that can be used to treat depression and Parkinson’s disease. Nonselective versions of these medications produced hypertensive crisis and other severe side effects when they were taken with tyramine-containing foods (some cheeses) and several other drugs. Newer members of this class of drugs do not have these effects, but should be used with caution, especially in persons who take selective reuptake inhibitors

**Mononucleosis** - presence of an abnormally high number of mononuclear leukocytes in the blood. An acute infectious disease caused by the Epstein Barr virus, a member of the herpes virus group. It is most common in the US in persons between 15 and 25 years of age; beyond that age, most persons are immune to it. The disease is sometimes referred to as the “kissing disease”. The virus is transmitted through the saliva with an incubation period of 30 to 45 days. Symptoms include a gradual onset of 7 to 14 days of flu like symptoms including a severe sore throat, fatigue, headache, chest pain, and myalgia. Findings include enlarged lymph nodes, exudative tonsillitis, and an enlarged spleen. The infection lasts 2 - 4 weeks.
Monotherapy - treatment with a single drug
Morbilliform - resembling measles or its rash
MRI - magnetic resonance imaging, while the CT (cat scan) uses dye for its images, MRI uses magnets, used for more extensive diagnostic tools for diagnosis
Mucocutaneous - concerning mucous membrane and the skin
Mucus membranes - the lining passages and cavities communicating with the air, example - mouth, nose
Multiple sclerosis - a chronic, slowly, progress disease of the central nervous system characterized by development of disseminated demyelinated glial patches called plaques, symptoms and signs are numerous, but common in later stages are those of nystagmus, scanning speech, and intention tremor, occurs in the form of many clinical syndromes, the most common being the cerebral, brainstem, cerebellar, and spinal, a history of remissions and exacerbations is diagnostic, reason is unknown and there is no specific treatment
Muscaric - pertaining to the effect of acetylcholine on parasympathetic ganglionic effector sites
Myalgia - tenderness or pain in the muscles, muscular rheumatism
Myasthenia gravis - a motor disorder marked by muscular fatigue that develops with repetitive muscle use and improves with rest. It is caused by antibodies to the acetylcholine receptor in the neuromuscular junction and a decrease in receptor sites for acetylcholine. Because the smallest concentration of acetylcholine receptors in the body is in the cranial nerves, weakness and fatigue of the eye muscles, muscles of mastication, and pharyngeal muscles are the most prominently affected in most patients. The disease is rare, affecting about 60 persons out of one million
Mydriasis - abnormal dilatation of the pupil like fright, sudden emotion, anemia, anesthesia, drugs, coma, hysteria, botulism irritation of cervical sympathetic nerve
Myelosuppressive - inhibition of bone marrow function
Myelotoxicity - destroying bone marrow; pertaining to or arising from diseased bone marrow
Myocardial - pertaining to the heart muscle
Myocarditis - inflammation of heart muscle, usually as a consequence of infections
Myoclonus - twitching or clonic spasm of a muscle or group of muscles, condition marked by persistent and continuous muscular spasms
Myopia - defect in vision so that objects can only be seen distinctly when very close to the eyes, nearsightedness
Myxedema - infiltration of the skin by mucopolysaccharides, giving it a waxy or coarsened appearance. Seen usually in patients with hypothyroidism. The clinical
and metabolic manifestations of hypothyroidism in adults, adolescents and children are complaints of sluggishness, cold intolerance, apathy, fatigue and constipation. Findings may include infiltration of the subcutaneous layers of the skin by mucopolysaccharides, which coarsen the features and create nonpitting edema. The hair may become dry and brittle. If the syndrome is left untreated, hypothermia, coma, and death may result.

**Narcolepsy** - a disorder marked by recurrent, uncontrollable attacks of daytime sleepiness, often associated with temporary muscular paralysis (cataplexy) that may occur after powerful emotional experiences. People affected by this condition may have several sleep attacks each day. Typically, narcoleptic patients arouse from sleep relatively easily.

**Narcotic** - producing stupor or sleep, a drug which in moderate doses depress the central nervous system thus relieving pain and producing sleep, but which in excessive doses produces unconsciousness, stupor, coma, and possibly death.

**Nasopharyngitis** - inflammation of the nasopharynx (throat/part of the pharynx situated above the soft palate).

**Necrolysis** - necrosis and dissolution of tissue - death of cells, tissues or organs.

**Necrosis** - deaths of areas of tissue surrounded by healthy parts, a gradual degeneration caused by blood supply to the area, physical agents such as trauma, radiant energy or products (toxins) of bacteria.

**Neonates** - a newborn infant up to 1 month of age.

**Nephrolithiasis** - a disorder characterized by the presence of calculi (stones) in the kidney.

**Nephrotoxic** - a specific toxin (poison), which destroys renal (kidney) cells.

**Nerve terminal** - a small nerve originating in the cerebral hemisphere in the region of the olfactory trigone, the 1st cranial nerve. The terminal nerve courses anteriorly (in front of) along the olfactory tract and passes through the ethmoid bone. Most filaments of the nerve form a single strand, which passes to the membrane near the anterior superior border of the nasal septum and communicates in the nasal cavity with the ophthalmic division of the trigeminal nerve. The central communications of the terminal nerve end in the septal nuclei, the olfactory lobe, and the posterior commissural and supraoptic regions of the brain.

**Neuralgia** - severe pain along the course of a nerve due to pressure on nerve trunks, faulty nerve nutrition, toxins, neuritis, usually no changes can be detected.
Neuroleptic - a condition of the nervous system, exhaustion of a nerve or nerves from prolonged stimulation, stretching of a nerve to relieve tension, loosening of adhesions surrounding a nerve, disintegration of nerve tissue

Neuromuscular - concerning the nerves and muscles

Neuroma - former term for any type of tumor composed of nerve cells. Classification is now made with respect to the specific portion of the nerve involved

Neuron - a nerve cell, the structural and functional unit of the nervous system, consisting of a cell body and its processes, an axon and one or more dendrites, neurons function in the initiation and conduction of impulses

Neurosis - also called psychoneurosis, a disorder of the thought processes not due to demonstrable disease of the structure of the central nervous system, probably due to unresolved internal conflicts which make for an uneasy adjustment in life, contact with reality is maintained which is not the case in psychosis, the neuroses are classified as fatigue, simple nervousness (anxiety), phobic, obsessive compulsive, hysteria, hypochondrial, reactive depression, the disease rarely occurs in one of these pure forms, thus most neurotic persons would be classes as having mixed psychoneuroses

Neurosyphilis - an infection of the central nervous system by syphilis organisms, which may invade the meninges and cerebrovascular system. If the brain tissue is affected by the disease, general paresis may result; if the spinal cord is infected, tabes dorsalis (an abnormal condition characterized by the slow degeneration of all or part of the body and the progressive loss of peripheral reflexes) may result

Neutropenia - the presence of an abnormally small number of neutrophils (a white blood cell) in the blood. Severely low levels predispose patients to infection

Neurotoxicity - having the capability to be poisonous or harmful to the nerve cells

Neutropenia - abnormally small number neutrophil (white blood cell) cells in the blood

Neutrotransmitter - a substance (norepinephrine, acetylcholine, dopamine) that is released when the axon terminals of a presynaptic neuron is excited and acts by inhibiting or exciting a target cell. Disorders of neurotransmitters have been implicated in the pathogenesis of a variety of neurological and psychiatric illnesses

NG - naso-gastric tube - inserted through the mouth or nose into the stomach to keep the stomach empty following surgery or if a need for alternative form of feeding to a debilitated patient.

NMS - Neuroleptic Malignant Syndrome - seen with adverse reactions to the sedatives and antipsychotic drugs - that lead to autonomic dysfunction, characterized by fever, tachycardia, tachypnea, and profuse diaphoresis
(sweating), unstable vital signs, speaking incoherently, disoriented, muscle rigidity, incontinence, tremor, and increased salivation
- urination especially during the night

**Nocturia** - excessive or frequent urination after going to bed

**Nonsteroidal anti-inflammatory drug** - (NSAID) - a drug that has analgesic, anti-inflammatory, and antipyretic actions. NSAID's are used to treat acute and chronic pain, including the pain of injuries, arthritis, and dysmenorrheal, to reduce inflammation; and to prevent complications in serious illness, such as sepsis. Many patients experience side effects of these medications, including upper gastrointestinal inflammation or bleeding. These side effects occur most often in elderly people, tobacco users, and people who drink alcohol. Other potential complications include acute and chronic renal failure, liver function abnormalities, and aseptic meningitis

**Norepinephrine** - a hormone produced by the adrenal gland similar in chemical and pharmalogical, properties to epinephrine but is chiefly a vasoconstricctor and has little effect on cardiac output

**Nucleic acid** - any one of a group of high-molecular weight chemicals that carry the genetic information crucial to the replication of cells and the manufacturing of cellular proteins. They have a complex structure formed of sugars, phosphoric acid, and nitrogen bases. Most important are RNA and DNA

**Nucleus** - a central point about which matter is gathered as in a kidney stone, the vital body in the protoplasm of a cell, the essential agent in growth, metabolism, reproduction and transmission of characteristics of a cell, a group of nerve cells or mass of gray matter in the central nervous system, especially the brain, heavy central atomic particle in which most of the mass and total positive electric charge are concentrated

**Nystagmus** - constant, involuntary more or less cyclical movement of the eyeball, movement may be in any direction, seen in congenital, occupational as in miners and train dispatchers, labyrinthine irritability, or in a neurologic disease

**O**

**Obsessive compulsive** - an uncontrollable desire to dwell on an idea or an emotion, or to perform a specific act, a dominating condition in certain psychoses, example continually washing of the hands

**Ocular** - concerning the eye or vision

**Oculogyric crisis** - producing or concerning movements of the eye, motions of the eyeball
Oliguria – diminished amount of urine formation, seen after profuse perspiration, bleeding and diarrhea, also in retention of urine due to brain disease, drug poisoning, deep coma
Oligohidrosis – the production or formation of little sweat
Onychomycosis – a fungal infection of the nails usually caused by tinea species and occasionally by Candida. The hallmarks of the disease are thickening, scaling, and discoloration of the nailbed. The treatment may cause liver dysfunction and the drugs are extremely expensive
Ophthalmic – pertaining to the eye
Ophthalmology – the science dealing with the eye and its diseases
Opiates – a drug derived from opium, a drug inducing sleep, to deaden, to put to sleep, very habit forming
Organic brain syndrome – a disease usually of the elderly associated with a gradual deterioration of the cognitive portion of the brain memory, comprehension, ideation, and orientation become defective
Oropharyngeal – the central portion of the pharynx lying between the soft palate and the upper palate and the upper portion of the epiglottis
Orthostatic – standing or an erect position
Osmotic – the movement of a pure solvent, as water, through a semipermeable membrane from a solution that has a lower solute concentration to one that has a higher solute concentration. The membrane is impermeable to the solute but is permeable to the solvent. The rate of osmosis depends on the concentration of solute, the temperature of the solution, the electrical charge of the solute, and the difference between the osmotic pressures exerted by the solutions. Movement across the membrane continues until the concentrations of the solutions equalize
Osteomalacia – a vitamin D deficiency in adults that results in a shortage or loss of calcium salts, causing bones to become increasingly soft, flexible, brittle, and deformed. An adult form of rickets, osteomalacia can also be traced to liver disease, cancer, or other ailments that inhibit normal metabolism of vitamin D
Osteoporosis – softening of the bone, a disease marked by increasing softness of the bone, so that they become more flexible and brittle and cause deformities, it is attended with rheumatic pains, the limbs, spine, thorax and pelvis especially are affected, anemia and signs of deficiency disease are resent, the patient becomes weak, and finally dies from exhaustion, occurs chiefly in adults – could be a deficiency of calcium salts or Vitamin D
Otitis – inflamed condition of the ear, it is differentiated as externa, media, and interna depending on the portion of the ear which is involved
Ototoxicity - having a detrimental effect on the eighth nerve or the organs of hearing

Ovulation - the periodic ripening and rupture of the mature follicle and the discharge of an ovum from the cortex of the ovary, occurs approximately 14 days before the next menstrual period

Oxidation - the process of a substance combining with oxygen, the loss of electrons with an accompanying increase in positive valence

P

Pallor - lack of color
Palpitations - rapid, violent or throbbing pulsation, as an abnormally rapid throbbing, or fluttering of the heart
Pancreatic - concerning the pancreas
Pancreatitis - inflammation of the pancreas - sudden and intense pain in the epigastric region, vomiting, belching of gas, sometimes hiccups, collapse, rigidity and tenderness over the belly button, constipation, slow pulse, possible jaundice - treatment is a slow long process, eating only clear liquids for several weeks
Pancytopenia - a reduction in all cellular elements of the blood
Papillary - a small nipple like protuberance or elevation
Papule - a small bump or pimple, that rises above the surface of the neighboring skin. Papules may appear in numerous skin diseases, including prickly heat, psoriasis, xanthomatosis, eczema, and skin cancers. Their color may range from pale to yellow, red, brown or black
Paracoccidioidomycosis - a chronic granulomatous disease of the skin
Paradoxical - seemingly contradictory, but demonstrably true
Paralysis - a temporary suspension or permanent loss of function, especially loss of sensation or voluntary movement
Paralytic ileus - pertaining to the intestinal wall with distention and symptoms of acute obstruction and prostration of the bowel
Paranoid - a chronic psychotic entry characterized by fixed but ever expanding systematized delusions of persecution, general characteristics are sensitive, suspicious, jealous, brooding nature, excessive self consciousness fixed ideas, developed in well systematized, logical delusions, rare hallucinations, inability to make concessions
Parasympathetic - of or pertaining to the craniosacral division of the autonomic nervous system
**Parenteral** - denoting any medication route other than the alimentary canal (stomach), such as intravenous, subcutaneous, intramuscular, or mucosal

**Paresis** - partial or incomplete paralysis, an organic mental disease with somatic, irritative and paralytic focal symptoms and signs running a slow chronic progressive course and tending to a fatal termination, diffuse and focal involvement of the brain and spinal cord due to syphilis usually 5 - 15 years after primary infection (memory defects, expansive delusions, depression, dementia), treatment is penicillin

**Paresthesia** - abnormal sensation without objective cause, such as numbness, prickling, and tingling, heightened sensitivity

**Parosmia** – any disorder or perversion of the sense of smell, a false sense of odors or perception of those, which do not exist, agreeable ones are found offensive and disagreeable ones are accepted as pleasant

**Pathogenic** - productive of disease

**Pellagra** - a deficiency disease or syndrome seen in certain parts of the world, characterized by cutaneous (skin), gastrointestinal, mucosal, neurological and mental symptoms, due to deficiency in diet or failure of the body to absorb niacin (Vitamin B’s) and usually associated with a deficiency of proteins which one would see in high corn diets, also may be secondary to gastrointestinal diseases or alcoholism

**Pemoline** - a central nervous system stimulating drug that is used in treating children with hyperkinesis and minimal brain damage - Cylert

**Perianal** - around the anus or rectum

**Periarteritis nodosa** - inflammation of the external coating of an artery

**Perineal** - the structures occupying the pelvic outlet and constituting the pelvic floor

**Periodontal abscess** - inflammation of a tooth with pus in an abscess form

**Peripheral** - located or pertaining to the outer part or surface of a body, part away from the center

**Peripheral edema** - swelling in the arms and legs, not in the heart, usually when the right side of the heart is failing not the left

**Peristalsis** - a progressive wave-like movement which occurs in involuntary in hollow tubes of the body, it is characteristic of tubes possessing longitudinal and circular layers of smooth muscle fibers, like the bowel

**Peritoneal** - concerning the peritoneum - which is the serous membrane lining the abdominal cavity and reflected over the viscera (any one of the large internal organs contained in the abdominal, the thoracic, or the pelvic cavities of the body
Peritoneal dialysis – similar to hemodialysis except this is done into the covering around all of the abdominal organs except the kidneys called the peritoneum, a tube is placed in the peritoneal space and 4 - 6 times a day the patient makes fluid exchanges to rid the body of wastes
Peritonitis – inflammation of the serous membrane that lines the abdominal cavity and its viscerae
Permeability – the condition of the capillary wall that enables substances in the blood to pass into tissue spaces or into cells or vice versa
Pernicious anemia – destructive, fatal, harmful, severe form of blood disease marked by progressive decrease in red blood cells, muscular weakness and gastrointestinal and neural disturbances, may be fatal if not treated with Vitamin B12, iron and diet
Petechiae – small, purplish hemorrhage spots in the skin which appear in certain severe fevers and are indicative of extreme exhaustion, may be due to abnormal blood clotting mechanism, also applied to similar spots occurring on mucous membranes or serous surfaces, red spots from bites of a flea
pH of blood – potential of hydrogen – a measure of the hydrogen ion concentration of a solution. In chemistry, the degree of acidity or alkalinity of a substance is measured in pH and normal is 7.35 - 7.45
Pharyngeal – concerning the pharynx
Pharyngitis – inflammation of the pharynx, usually associate with inflammation of the nasal mucosa – malaise, fever, dysphagia, pain in throat, secretions – treat with gargles, lozenges, bedrest, adequate fluids, analgesics, appropriate antibiotics after culture done
Pharyngolaryngeal – combining form meaning the throat and the larynx
Pharynx – a musculo-membraneous tube extending from the base of the skull above to the level of the 6th vertebrae below where it becomes continuous with the esophagus, communicates with the nose, eustachian tube, mouth, esophagus and larynx, serves as a passageway for air from the nasal cavity to the larynx and food from the mouth to the esophagus
Phenothiazides – a classification of drugs that deal with psychotic symptoms
Phlebitis – inflammation of a vein – may be acute or chronic following operations or childbirth – will see pain and tenderness along course of vein, discoloration of skin, inflammatory swelling and acute swelling below obstruction, rapid pulse, mild elevation of temperature, pain in joints
Phosphatemia – phosphates in the blood – a salt important in the maintenance of acid-base balance
Photophobia - unusual intolerance to light, occurs in measles and rubella, meningitis and inflammation of the eyes

Photosensitivity - condition in which the skin reacts abnormally to light, especially ultraviolet rays or sunlight, due to the presence of drugs, hormones or heavy metals in the system

Pigmentary - any coloring matter, produced with in the body as in bile from the gall bladder

Pigmentary retinopathy - caused by a pigment disorder of the retina

Pineal - shaped like a pine cone - pertaining to the pineal gland; it lies in the brain close to the brain stem in the epithalamus. Its main function has not been established, may excrete melatonin

Pituitary - an endocrine gland secreting a number of hormones, which regulate many bodily processes including growth, reproduction, and various metabolic activities, often referred to as the master gland of the body

Pityriasis - a skin disease characterized by branny scales

Placebo - inactive substance given to satisfy patients' demand for medicine, also used in controlled studies of drugs, the placebo is given to a group of patients and the drug being tested is given to a similar group, then the results obtained in the two groups are compared

Platelet - found as a disc or round in the blood - play an important role in blood clotting and blood clot formation

Pleural effusion - fluid in the space between the thorax and the diaphragm, which surround the lungs

Pleurisy - inflammation of the pleura (which is the serous membrane that enfolds the lungs upon the walls of the thorax and the diaphragm) may be primary or secondary, unilateral, bilateral, or local, acute or chronic, fibrinous, sero fibrinous or purulent (pus), in simple pleurisy, absolute rest is essential with plenty of sunlight and fresh air, assistance with movement and keep the patient cheerful, increase fluid intake

Pneumococcal - an oval shaped gram positive bacteria of the Strep family, which can cause pneumonia

Pneumonia - inflammation of the lungs caused primarily by bacteria, virus, chemical irritants, vegetable dusts and allergens, which begin suddenly, are caused by pneumococci, staphylococci, streptococci, and bacilli, and aspiration

Polydipsia - excessive thirst

Polyphagia - eating abnormally large amounts of food at a meal
Polyuria - excessive secretion and discharge of urine, the urine as a rule does not have abnormal constituents, may urinate up to 6000 cc per day, higher in diabetic patients, or treating a patient with diuretics

Porphyria - One of a group forming basis of animal and plant respiratory pigments, obtained from hemoglobin and chlorophyll, a rare metabolic disorder characterized by excessive excretion of porphyrins, acute abdominal pain, and neurologic disturbances, sometimes precipitated by excessive amounts of sulfonamides, barbiturates, or other drugs, also sensitivity to light is characteristic

Postencephalatic - occurring after encephalitis; an abnormal state remaining after the acute stage of encephalitis has passed

Postsynaptic - process occurs slower at the point of junction in a neural pathway between two neurons, where the end of the axon of one neuron comes into close proximity with the cell body or dendrites of another

Potassium - a mineral element found in combination with other elements in the body constituting 35% of body weight, principal of function is in intracellular fluid and is essential along with sodium and magnesium for normal excitability of muscle tissue especially heart muscle and it plays an important role in the conduction of nerve impulses, disorders of low potassium can be leg cramps, irregular heart beats, foods high in potassium are cereals, dried peas and beans, fresh vegetables, fresh or dried fruits, nuts, molasses cocoa, fried fish and fresh poultry

Potentiate - to augment or increase the potency or action

Premature ventricular contractions or PVC's - the contraction of the cardiac ventricle prior to the normal time, caused by an electrical impulse to the ventricle arising from a site other than the sinus node. The PVC may be a single event or occur several times in a minute or in pairs or in strings. Three or more PVC's in a row constitute ventricular tachycardia

Presynaptic - the point of junction in a neural pathway between two neurons where the end of the axon of one neuron come into close proximity with the cell body or dendrites of another, but the whole process occurs prematurely

Priapism - abnormal, painful and continued erection of the penis caused by disease, occurring usually without sexual desire

Profuse - large amount as in perspiration

Progesterone - a steroid hormone obtained from the corpus luteum, adrenals, or placenta, it is responsible for changes in menstrual cycle, development of the placenta, and development of the mammary glands, used in treatment of menstrual disorders

Progestin - a corpus-luteum hormone that prepares the endometrium for implantation of the fertilized ovum
**Prolactin** - hormone derived from the anterior pituitary lobe, which stimulates lactation, it also produces luteotrophic effects and is considered identical to luteotrophicine

**Prophylactically** - warding off disease, an agent, which wards off disease, a chemical substance or physical device used to prevent venereal disease

**Prophylaxis** - observance of rules necessary to prevent disease, as in cleaning your teeth every 6 months

**Prostatic hypertrophy** - enlargement of the prostate gland in men

**Prostatitis** - inflammation of the prostate gland, usually as a result of infection

**Protein** - one of a class of complex nitrogenous compounds that are synthesized by all living organisms and yield amino acids when hydrolyzed. Proteins in the diet provide the amino acids necessary for the growth and repair of tissue

**Proteinuria** - proteins in the urine

**Protime/INR** - a blood test - the time in seconds it takes for blood to clot when a patient is taking a medication to thin their blood like Coumadin - normal is 10 - 14 seconds. The INR is another way to measure and monitor the PT (prothrombin time) in someone taking oral anticoagulant. Normal is 2.0 - 3.0 except for someone with a mechanical prosthetic heart valve, then normal value is 2.5 - 3.5 is suggested

**Pruritus** - severe itching, may be symptomatic or occur idioopathically as a neurosis without structural change

**Psoriasis** - chronic inflammatory skin disease of many varieties characterized by formation of silvery scaling patches on the body, begins in adult life usually with scaly patches of white scales with red bleeding points under them

**Psychological** - pertaining to study of the mind in all of its relationships, normal and abnormal

**Psychomotor** - concerning or causing voluntary movement

**Psychoneurotic** - one of a group of mental disorders of a functional nature in which there is partial disorganization of the psyche, a psychopathological syndrome characterized principally by anxiety attacks, phobias, compulsions, obsessions, and conversion phenomena, insight is maintained, includes hysteria

**Psychoses** - a term formerly applied to any mental disorder but now generally restricted to those disturbances with great magnitude that there is personality disintegration and loss of contact with reality, they are of psychogenic origin, or without clearly defined physical care or structural change in the brain

**Psychotropic** - a drug that affects psychic function, behavior or experience. Many drugs can be classed as being intentionally psychotropic, but many other drugs also occasionally may produce undesired psychotropic side effects
Psyllium - the dried ripe seed of the psyllium plant used as a mild laxative. It is also used in symptomatic treatment of diarrhea. It enhances stool consistency by absorbing water from the bowel contents

Ptosis - dropping or drooping of an organ or part, as the upper eyelid from paralysis, or the visceral organs from weakness of the abdominal muscles (from obesity)

Pulmonary - concerning or involving the lung

Pulmonary edema - a condition in which the body tissues contains an excessive amount of tissue fluid around the lungs, edema may result from increased permeability of the capillary walls, increased capillary pressure due to venous obstruction or heart failure

Pulmonary insufficiency - the heart muscles become weakened by age or by some disease process and then the heart pumping action no longer can do its job therefore most body functions suffer in the long run and after so long a time evidence is seen of its deterioration if not treated

Purpura - an affection with various manifestations and obscure etiology characterized by hemorrhages into the skin, mucous membranes, internal organs, and other tissues, hemorrhage into the skin shows red, darkening into purple, then brownish-yellow and finally disappearing in from 2 - 3 weeks, areas of discoloration do not disappear under pressure

PVC's - premature ventricular contraction - irregular heart beats, which almost everyone has at some point or another, some can feel these irregular beats and others can not

Pyrexia - condition in which the temperature is above normal, acute inflammation of a part

Q

QT interval - part of the electrocardiogram, needs to be with in a certain time frame or irregularities will occur

R

Raynaud's Disease or Syndrome - a condition caused by an abnormal degree of spasm by the blood vessels of the extremities, especially in response to cold temperatures, which would not affect a normal person, in one form a part, usually a finger or toe, becomes pale, cold, anesthetic, after a time these phenomena disappear and are followed by redness, heat and tingling, attacks may be excited
by cold and come and go without damaging the part, in another form, affected part becomes swollen, dark, red, painful, if attack persists, bullae may appear and gangrene develops, gangrenous areas often symmetrical, involving a finger on each hand, toe on each foot, or both ears, attacks persist but not life threatening, in rare cases, extensive gangrene develops and death occurs

**RBC’s** - red blood cells, function is to carry oxygen and carbon dioxide, they may also play a role in the regulation of the acid-base balance of the blood and in the formation of bile pigments, which are derived from decomposition products of hemoglobin

**Rectal** - pertaining to the rectum - lowest part of the large intestine or bowel

**Recurrent** - relapse

**Red blood cells** - erythrocyte made up of lipids and proteins. The primary function of RBC's to carry oxygen. It also contributes to the acid-base balance of the blood by acting as a buffer for the transport of carbon dioxide in the plasma as bicarbonate ions

**Reflux** - a return or backward flow

**REM** - rapid eye movement - cyclic movement of the closed eyes observed or recorded during sleep

**Renal** - pertaining to the kidney

**Respiratory** - pertaining to respiration - a center in the medulla which regulates the movement of breathing, consists of an inspiratory phase with the inhalation of air and the exhalation of carbon dioxide

**Respiratory arrest** - cessation of breathing (stopping) - CPR (cardio-pulmonary resuscitation) needs to be initiated immediately

**Respiratory depression** - due to many causes, respiration may be shallow, almost non existent, the pH of the blood may be acidic or alkaline. The patient may have periods of apnea (respirations stopped) and most likely will be very ill. Support with oxygen or ventilation and work on the cause of the depression

**Reticular** - meshed or in the form of a network

**Reticulocyte** - an immature erythrocyte (RBC) characterized by a meshlike pattern of threads and particles at the former site of the nucleus. They are made up of less than 1% of the circulating erythrocytes; a greater proportion reflects an increased rate of erythropoiesis

**Retina** - it receives image from the lens of the eye and is immediate instrument of vision, it is a light sensitive structure upon which light rays come into focus

**Reye's syndrome** - acute childhood disease, causes fatty infiltration of the liver with hyper ammonemia, encephalopathy, and increased intracranial pressure, affects infants through adolescence and equally in boys and girls, affects whites
over age 1 more often than blacks, caused by 1 - 3 days of acute viral infection, such as an upper respiratory infection or an urinary tract infection or chickenpox, diagnosed by increased serum ammonia, abnormal clotting factors and liver function tests, give non aspirin drugs

**Rhinitis** - inflammation of the nasal mucosa, common head cold, acute congested condition of the nose with increased secretion of mucous

**Ribosome** - a cell organelle made of ribosomal RNA and protein. Ribosomes may exist singly, in clusters called polyribosomes, or on the surface of rough endoplasmic reticulum. In protein synthesis, they are the site of messenger RNA attachment and amino acid assembly in the sequence ordered by the genetic code carried by mRNA

**Rickets** - a condition of softness in the bone in children resulting from deficient deposits of lime salts in developing cartilage and newly formed bone, resulting in abnormalities in shape and structure of bones, due to Vitamin D deficiency which affects the absorption of calcium and phosphorous from the intestine and the re-absorption of phosphorous by the renal tubules, may also result from inadequate intake or excessive loss of calcium

**Rhabdomyolysis** - an acute sometimes fatal disease in which the byproducts of skeletal muscle destruction accumulate in the renal tubules and produce acute renal failure. It may result from crush injuries, the toxic effect from drugs or chemicals on skeletal muscle, extremes of exertion, sepsis, shock, and severe hyponatremia (low sodium in the blood), among other diseases and conditions. Management may include the infusion of bicarbonate containing fluids to enhance urinary secretion of myoglobin and iron or hemodialysis

**Rhinorrhea** - a thin watery discharge from the nose

**Rigidity** - tenseness, immovability, stiffness, inability to bend or be bent, in psychiatry refers to one who is excessively resistant to change

**Rigors** - a sudden paroxysmal chill with high temperature, called the cold stage, followed by a sense of heat and profuse perspiration, called the hot stage, a state of harness and stiffness as in a muscle, rigor chills may be coarse, fine, diffuse, trembling

**Ringworm** - the popular term for any skin infection caused by fungi. The symptom is a well defined red rash, with an elevated, wavy, or worm shaped border

**RNA** - ribonucleic acid - a nucleic acid found primarily in the nucleolus, microsomes, and mitochondria of cells, it appears to play an important role in synthetic reactions within cells
**Salivation** - excessive secretion of saliva from the mouth

**Scarlatiniform** - resembling scarlatina or its rash form of scarlet fever

**Schizophrenia** - the most important of the psychoses characterized by loss of contact with the environment and by disintegration, hospitalization is usually required

**Sclera** - the white (or sclerotic outer coat) of the eye

**Scotoma** - island-like blind gap in the visual field seen in situations where there is absolute blindness, may not always be completely closed, lesions in the macula, color blindness, by looking directly into an eclipse, a blind spot where the absence of rods and cones where optic nerves enters the retina

**Scurvy** - a deficiency disease characterized by hemorrhagic manifestations and abnormal formation of bones and teeth, deficiency of Vitamin C usually resulting from lack of fresh fruits and vegetables in diet, will see ill health, sallow, loss of energy, pain in legs, limbs and joints anemic, great weakness, spongy, bleeding gums, bad breath, loosening of teeth

**Seborrhea** - functional disease of the sebaceous glands marked by increase in the amount and often alteration of the quality of the sebaceous secretion, a gland of the skin, which open into hair follicles

**Seizures** - a convulsion or other clinically detectable event caused by a sudden discharge of electrical activity in the brain; a sudden attack of pain, disease, or specific symptoms

**Senna** - the dried leaves of a plant used as a cathartic

**Septohippocampal** - the hippocampus is important is establishing new memories

**Serotonin** - a vasoconstrictor, substance that can be extracted from the blood, constricting of a blood vessel

**Serum** - any serous fluid especially the fluid which moistens the surfaces of the serous membranes, the watery portion of the blood after coagulation, fluid found when clotted blood is left standing long enough for the clot to shrink

**SIADH** - Syndrome of Inappropriate Antidiuretic Hormone

**Sinusitis** - inflammation of a sinus, especially a paranasal sinus, may be caused by viruses, bacteria or allergy

**Skeletal** - pertaining to the skeleton, especially skeletal muscle which are attached to parts of the skeleton and involved primarily in movements of the parts of the body

**Sleep apnea** - the temporary absence of breathing during sleep. This common disorder is classified according to the mechanism involved with daytime sleepiness
Sodium - constitutes approximately 15% of elements of the body, found in fluids of the body, serum, blood, and lymph, and in the tissues, the concentration being lower in the tissues, they are necessary to preserve a balance between calcium and potassium to maintain normal heart action and the equilibrium of the body, they regulate osmotic pressure in the cells and fluids, and act as an ion balance in tissues, produce a buffer action in the blood, and guard against excessive loss of water from the tissues

Sodium bicarbonate - white, odorless powder with saline taste, a buffer in the acid base system

Somnolence - prolonged drowsiness of a condition, resembling trance, which may continue for a number of days, sleepiness

Sphincter - circular muscle constricting an orifice or opening

Status epilepticus - continuous seizure activity without a pause, that is, without an intervening period of normal brain function

Steroidogenesis - production of steroids

Sterols - one of a group of substances (such as cholesterol) with a cyclic nucleus and alcohol moiety (a part or portion). They are found free or esterified with fatty acids (Cholesterides). They are found in animals or in plants. They are generally colorless, crystalline compounds, nonsaponifiable (unable to be turned into a soap or lather) and soluble in certain organic solvents

Steven Johnson Syndrome - a side effect of sulfonamides - most serious, onset may be sudden, symptoms with lesions on the skin and mucous membranes, severe pain in muscosa are as accompanied by photophobia, fever, malaise, inability to eat or drink, lesions produce a thick hemorrhagic crusting on the lips, eyelids and genitalia may erode, temperature 102.5 for 7-9 days as the lesions dry and heal, may be life threatening, obtain daily skin and blood cultures, watch fluid and electrolyte balance, give Aspirin or Tylenol for fever, sponge lesion areas with betadine, if ordered Prednisone to decrease inflammation

Stomatitis - inflammation of the mouth, may be caused by many factors or conditions, heat, pain, flow of saliva, restlessness, bad breath, exhaustion - bacteria, viruses, mechanical trauma, alcohol, tobacco, hot foods, spices, sensitization to chemical substances in tooth pastes, mouth washes, nutritional deficiencies, blood disorders, poisoning by drugs, especially heavy metals, certain skin disorders, systemic infections such as measles, scarlet fever, syphilis

Stupor - condition of unconscious, lethargy with suppression of sense or feeling, a state of lessened responsiveness, occurs in visceral and infectious diseases, melancholia, catatonia, epilepsy, paresis, poisonings, and hysteria, a benign form is seen is manic-depressive psychosis
Subcortical – pertaining to the region beneath the cerebral cortex in the brain
Subdural - layers of tissues over the brain as a covering, beneath the dura matter, which is another layer
Submandibular – beneath the mandible or lower jaw
Succinimides - A class of drugs useful in anticonvulsants such as Ethosuximide (Zarontin), Phensuximide (Milontin), and Methsuximide (Celontin). They can also be used to form covalent bonds between proteins or peptides and plastics which is useful in a variety of assay techniques
Suicidal ideation - having thoughts of committing suicide
Suprachiasmatic - supra means above or over and chiasmatic means the visible point of connection between homologous chromosomes during the first meiotic division in gametogenesis. The x-shaped configurations form during the late prophase stage and provide the means by which exchange of genetic material occurs
Susceptibility - having little resistance to a disease or foreign protein, an individual with little resistance to an infectious disease or who is not known to have become immune to one, easily impressed or influenced
Sympathetic - pertaining to the sympathetic nervous system versus the parasympathetic nervous system, a division of the autonomic nervous system, the sympathetic system produces vasoconstriction in the part supplied where the parasympathetic system deals with the vasodilatation of the part supplied
Synapse - the space between the junction of two neurons in a neural pathway, where the termination of the axon of one neuron comes into close proximity with the cell body or dendrites of another. The electrical impulse traveling along a presynaptic neuron to the end of its axon releases a chemical neurotransmitter that stimulates or inhibits an electrical impulse in the postsynaptic neuron; synaptic transmission is in one direction only. Synapses are susceptible to fatigue, offer a resistance to the passage of impulses, and are markedly susceptible to the effects of oxygen deficiency, anesthetics, and other agents, including therapeutic drugs and toxic chemicals
Syncope - a transient loss of consciousness due to an inadequate blood flow to the brain - due to peripheral circulatory failure, cardiac failure or disturbances, or altered quality of the blood as in hyperventilation or hypoglycemia, predisposing factors are fatigue, prolonged standing, nausea, pain, emotional disturbances, anemia, dehydration, poor ventilation - treatment is to stimulate the heart, fresh air, treat underlying causes, if seated, depress the head between the knees compressing abdominal viscera, remove tight clothing, apply sudden dash of cold water or cold cloth, aromatic spirits of ammonia
**Synthesis** - the union of elements to produce compounds; the process of building up. The process or processes involved in the formation of a complex substance from simpler molecules or compounds, as the synthesis of proteins from amino acids. Synthesis is the opposite of decomposition

**Tachycardia** - abnormal rapidity of the heart action using above 100 beats per minute, maybe due to exercise, hyperthermia, hemorrhage, anoxia, infections, cardiac failure and certain like atropine, epinephrine and nicotine

**Tachypnea** - abnormal rapidity of respirations, forty or more per minute resulting in hyperventilation, occurs in hysteria, etc

**Tardive dyskinesia** - descriptive disease wherein the characteristic sign or symptom appears late in the course of the disease, it has been observed with all classes of antipsychotic drugs, although the precise cause is not known, the syndrome is most commonly seen in older patients, especially women, and in individuals with organic brain syndrome, it is often aggravated or precipitated by the sudden discontinuation of antipsychotic drugs and may persist indefinitely after the drug is discontinued, early signs include the fine rolling movements of the tongue and grimacing or tic like movements of the head and neck, no known cure, it may not progress if the dosage of the drug is slowly reduced, a few drug free days may unmask the symptoms and help in early diagnosis

**Tetnic** - a nervous affection characterized by intermittent tonic spasms, which are usually paroxysmal and involve the extremities, most frequent in the young, frequently associated with pregnancy and lactation, is induced by changes in the ph and extracellular calcium

**Thalamus** - the largest subdivision of the second portion of the brain in the third ventricle, all sensory impulses with the exception of the olfactory impulses (smell) are received by the thalamus, these are associated and synthesized and then relayed through radiations to specific cortical areas, impulses are also received by the cortex, hypothalamus, and corpus striatum and relayed to visceral and somatic effectors, also the center for appreciation of primitive uncritical sensations of pain, crude touch, and temperature

**Thioester** - esters are commonly liquids with characteristics fruity or flowery odors

**Thorazine** - a central nervous system depressant and employed as a sedative and antiemetic, potentiates the effects of sedatives and general anesthetics and is of value in quieting severely excited psychiatric patients
Thrombocytopenia – abnormal decrease in number of the blood platelets
Thrombophlebitis – inflammation of a vein developing before the formation of a thrombus (clot)
Thrombosis – the formation of a blood clot, it is a solid aggregation formed in the circulating blood, when it is detached from the original site it becomes a thrombotic embolism, occurs following an operation, cardiac and vascular problems, obesity, heredity, increasing age, an excess of RBC's and of platelets an overproduction of fibrinogen and sepsis are predisposing factors – symptoms include sudden onset of severe pain in the chest area, difficulty breathing, blood pressure falls, pulse becomes rapid, fever, increased WBC's
Thrush – infection of the mucosa of the mouth caused by Candida. In patients with healthy immune systems, it occurs when the balance of normal flora is destroyed during antibiotic therapy or following the use of corticosteroid based inhalers, which suppress normal white blood cell function in the mouth. It is also common in patients receiving immunosuppressive therapy for organ transplants, in cancer patients, in AIDS patients, in neonates and in persons who wear dentures
Thyrotoxicosis – a condition resulting from exposure of body tissues to excessive levels of thyroid hormones. This may be caused by an overactive or damaged thyroid gland or by the administration of excessive doses of thyroid hormone
Thyroxine – one of the principal hormones secreted by the thyroid gland that increases the use of all food types for energy production and increases the rate of protein synthesis in most tissues. It is used to treat hypothyroidism
Tic movements – a spasmodic muscular contraction, most commonly involving the face, head, neck, or shoulder muscles, the spasms may be tonic or clonic, movement appears purposeful is often repeated, involuntary, can be inhibited for a short time, only to burst forth with increased severity, injection of the nerve with alcohol, anticonvulsants may be helpful to shorten attacks or cause remission
Tinea corporis – a fungus skin disease. It begins with red, slightly elevated scaly patches that on examination reveal minute vesicles or papules. New patches spring from the periphery while the central portion clears. There is often considerable itching
Tinea cruris – a fungus skin disease of surfaces of contact in the scrotal, crural, anal, and genital areas. Also called “jock itch”
Tinnitus – a ringing or tingling sound that is purely subjective, may be due to inner, middle or external ear problems.
Tonic – pertaining or characterized by tension or contraction especially muscular tension, restoring tone, a medicine that increases strength and tone, a persistent involuntary, firm or violent muscular contraction
**Torsades de points** - a possibly fatal heart rhythm, which can lead to ventricular tachycardia or ventricular fibrillation

**Torticollis** - stiff neck associated with muscle spasms, classically causing lateral flexion contracture of the cervical spine musculature. It may be congenital or acquired. The muscles affected are principally those supplied by the spinal accessory nerve

**Total parenteral nutrition (TPN)** - the intravenous (IV) provision of dextrose, amino acids, emulsified fats, trace elements, vitamins, and minerals to patients who are unable to assimilate adequate nutrition by mouth. Patients with many illnesses become malnourished if they are unable to eat balanced diet for more than a few weeks

**Tourette's disease** - convulsive tic with echolalia (an involuntary parrot like repetition of words spoken by others, often accompanied by twitching of muscles, frequently seen in catatonic schizophrenic) and coprolalia (a morbid desire to use sacrilegious or obscene words in ordinary conversation, seen in obsessive neuritis or dementia), associated with motor incoordination

**Toxemia** - distribution throughout the body of poisonous in a focal or local site, thus producing generalized symptoms. The symptoms are marked by fever, diarrhea, vomiting, and symptoms of shock

**Toxic** - pertaining to, resembling or caused by poisons

**Tracheal** - pertaining to the trachea, starts at the larynx to the bronchial tubes to the lungs, lined with mucous membranes

**Transaminase** - old name for aminotransferase; an enzyme that catalyzes the transfer of an amino group from an alpha – amino acid to an alpha – keto acid, with pyridoxal phosphate and pyridoxamine phosphate acting as coenzymes

**Transient** - symptoms, which may occur for only a few moments then return to normal - example- dizziness

**Transient ischemic attack (TIA)** - a neurologic deficit, having a vascular cause, that produces stroke symptoms that resolve within 24 hours. (In practice, most TIA's resolve within an hour of onset.) Patients who have suffered a TIA have an increased risk of peripheral and coronary artery atherosclerosis, and an increased risk of subsequent heart attack and stroke

**Trichophyton mentagrophytes** - a species, one form of which, called granulare, is parasitic on several mammals including horses, dogs and rodents and can also affect humans. Another variety, called interdigitale, is associated with tinea pedis

**Trichophyton Rubum** - a genus of parasitic fungus that lives in or on the skin or its appendages (hair and nails) and is the cause of various dermatomycoses and
ringworm infections. Species that produce spores arranged in rows on the outside of the hair are designated ectothrix; if spores are within the hair, endothrix

**Trigeminal neuralgia** - a neurologic condition of the trigeminal facial nerve, characterized by paroxysms of flashing, stablike pain radiating along the course of a branch of the nerve from the angle of the jaw. Neuralgia of the first branch results in pain around the eyes and over the forehead; of the second branch, pain in the upper lip, nose, and cheek; of the third branch, pain on the side of the tongue and the lower lip. The momentary bursts of pain recur in clusters lasting many seconds; paroxysmal episodes of the pain may last for hours

**Triglycerides** - any combinations of glycerol with three of five different fatty acids. These substances triacylglycerols, are also called neutral fats. In the blood, triglycerides are combined with proteins to form lipoproteins. The liver synthesizes lipoproteins to transport fats to other tissues, where they are a source of energy. Fat in adipose tissue is stored energy

**U**

**Ulcerative** - to produce or become affected with an ulcer - an open sore or lesion of the skin or mucous membrane of the body sometimes accompanied with pus

**Ulcerative colitis** - ulcer-like areas in the colon or bowel

**Unconjugated** - not paired or joined

**Urea cycle disorder (UCD)** - the complex cyclic chemical reactions in some (ureotelic) animals, including humans, that produce urea from the metabolism of nitrogen containing foods. This cycle provides a method of excreting the nitrogen produced by the metabolism of amino acids as urea. This is known as the Krebs cycle

**Uremia** - in patients with renal failure, the intoxication caused by the body's accumulation of metallic byproducts that are normally excreted by healthy kidneys. Symptoms are nausea, vomiting, anorexia, headache, dizziness, coma, or convulsions

**Urethritis** - inflammation of the urethra, which is the canal for the discharge of urine extending from the bladder to the outside

**URI** - upper respiratory disease

**Uric acid excretion** - end product of purine metabolism formed from purine bases derived from nucleoproteins, common constituent of urinary and renal stones and gouty situations, must be excreted as it cannot be destroyed within the body - increased in gout, leukemia, after exercise, rheumatism and the ingestion of nitrogenous foods

**Urinalysis** - a lab term used in the analyzing of urine for diagnosing purposes
Urinary frequency - a greater than normal frequency of the urge to void without an increase in the total daily volume of urine. The condition is characteristic of inflammation in the bladder or urethra or of diminished bladder capacity or other structural abnormalities. Burning and urgency with increased frequency herald an infection of the urinary tract. Infection requires precise diagnosis and specific antibacterial medication; structural abnormality may require surgical correction.

Urinary retention - retaining in the body, that which should be excreted or does not belong there.

Urobilinogen - a colorless derivative of bilirubin from which it is formed by the action of intestinal bacteria.

Urticaria - a vascular reaction of the skin characterized by the eruption of pale, wheals, which are associated with severe itching - hives, rashes - caused by external irritant, physical agents, foods, insect bites, pollens, drugs which increases nervous and muscular excitability, causative factors are parathyroid deficiency of operative removal of parathyroids in thyroidectomy, alkalosis or vitamin D deficiency, characterized by nervousness, irritability and apprehension, numbness and tingling of the extremities, cramps of the various muscles, particularly the hands producing a typical type of hand and extreme extension of the feet, bilateral tonic spasms in arms and legs, jaws rarely involved, contractions usually paroxysmal and are attended with pain, electrocontractility of muscles greatly exaggerated, may be slight edema, sensation not disturbed, mind clear, fever slight or absent.

UTI - urinary tract infection, usually affecting the bladder, drink extra fluids and antibiotics are needed.

V

Vaginitis - inflammatory of the vagina.

Vagus nerve - the 10th cranial nerve, mixed nerve having motor and sensory functions and a wider distribution than any other of the cranial nerves, a slow pulse caused by the slowing action of the heart due to inhibition of the vagus nerve.

Vascular - the heart, blood vessels, lymphatics and their parts considered collectively, a constriction or dilatation of the vascular trunk or area resulting from mental or physical irritation.

Vascular anomaly - an abnormal blood vessel.

Vasodilatation - dilatation of blood vessels especially small arteries and arterioles which causes relaxation of the blood vessels, a nerve or drug which dilates the blood vessels.
**Vasomotor** - pertaining to the nerves having muscular control of the blood vessel walls, a vasomotor reflex is one in which the stimulus (a horrifying sight) results in a change in vasomotor stage (paleness in the face)

**Vasopressor** - it is a hormone found in the hypothalamus and has an antidiuretic and a pressor effect elevating the blood pressure

**Ventricular** - one of the two chambers of the heart which propel blood into the arteries, the right ventricle forces blood into the pulmonary artery and the lungs to be reoxygenated by the air we inhale and the left ventricle pushes blood into the aorta and through our body

**Ventricular fibrillation** - a cardiac arrhythmia marked by rapid, disorganized depolarizations of the ventricular myocardium. The condition is characterized by a lack of organized electrical impulse, conduction, and ventricular contraction. Blood pressure falls to zero, resulting in unconsciousness. Death may occur within 4 minutes. Defibrillation and ventilation must begin immediately

**Vertigo** - true vertigo is the sensation either of moving around in space or having objects moving about the person, the subject has difficulty maintaining equilibrium, this is due to a disturbance of the sense of balance, vertigo is faintness, lightheadedness or dizziness, may be caused by a variety of entities including middle ear disease, toxic conditions such as those caused by salicylates (aspirin), alcohol, streptomycin, sunstroke, postural hypotension, toxemia caused by food poisoning or infectious diseases

**Vitreous** - pertaining to the vitreous body of the eye, a transparent jellylike mass that fills the cavity of the eyeball, enclosed by a membrane

**Vulvavaginal** - pertaining to the vulva (the female external genitalia) and the vagina

**W**

**WBC's** - the leukocyte or white blood cell, which helps the body fight infection

**X**

**Xerophthalmia** - conjunctival dryness due to deficiency of Vitamin A

**Y**

**Z**
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