

Chapter 33

Pharmacology and Preparation for Drug Administration

Chapter 33

Lesson 33.1

Learning Objectives

Theory

- 1) Summarize the different classifications of drugs based on their specific actions.
- 2) Explain the legal implications of administration of drugs by nurses.
- 3) Summarize the general actions of drugs in the body.
- 4) Discuss areas of concern regarding medication administration to children or the elderly.
- 5) Analyze issues of medication administration in home care.

Pharmacology

- The number and variety of drugs have increased in the past decade
- New drugs appear on the market on a regular basis
- Some drugs have been around for a long time, such as opium and castor oil (1600 BC), insulin (1922), sulfanilamide (1937), and penicillin (1942)

Pharmacology (cont'd)

- Physicians, pharmacists, and nurses are legally responsible for safe and therapeutic effects of drugs
- To prepare for medication administration, one must:
 - Be able to locate the information about each drug
 - Consistently calculate drug dosages accurately
 - Devise a method for using the Six Rights and five rules of medication administration consistently
 - Recognize the nursing implications
- Nurses must be knowledgeable about possible drug interactions

Nurses and Pharmacology

- Nurses must be knowledgeable about:
 - Appropriate dosage for the patient
 - Generic and trade names for drugs
 - Desired effect of the drug, possible adverse reactions, and expected side effects
 - Drug-drug interactions, drug-food interactions
 - Preparation of the drug for administration

Drugs

- Drugs have three names:
 - Chemical name
 - Provides a chemical composition of the drug
 - Generic name
 - A name NOT protected by a trademark
 - Trade name
 - A name protected by a trademark
 - Ibuprofen is marketed under the trade names of Advil and Motrin

Who Prescribes Drugs

- Physicians
- Dentists
- Osteopaths
- Veterinarians
- Physicians' assistants
- Nurse practitioners
- Advanced-practice nurses

Drug Classifications

- Classifications defined by:
 - Effect of the drug (e.g., anticonvulsants)
 - Symptoms the drugs relieves (e.g., antihypertensives)
 - Drug's desired effects (e.g., analgesics)
- A drug may belong to more than one class (e.g., aspirin is antipyretic, antiinflammatory, and analgesic, and has anticlotting properties)
- Nursing implications guide safe, effective administration

Drug Standards

- For a drug to pass Food and Drug Administration (FDA) approval and be marketed, it must meet standards in five areas: purity, potency, bioavailability, efficacy, and safety
- Health care institutions establish individual policies to prevent health problems resulting from drug administration

Uses for Drugs

- Treatment
- Palliation
- Diagnosis
- Cure
- Prevention of disease

Legal Control of Drugs

- Manufacture and sales of drugs regulated by:
 - The Pure Food and Drug Act of 1906
 - The Federal Food, Drug, and Cosmetic Act of 1938
 - The Comprehensive Drug Abuse Prevention and Control Act of 1970
- In the hospital, responsibility for security of controlled drugs is shared by pharmacists and nurses

Schedule of Controlled Drugs

- Schedule I
 - Drugs with no accepted medical use and a high potential for abuse
- Schedule II
 - Drugs with a medical use and a high potential for abuse and/or dependence
- Schedule III
 - Drugs that are medically useful but with less potential for abuse

Schedule of Controlled Drugs (cont'd)

- Schedule IV
 - Drugs that are medically useful but with less potential for abuse than schedule III drugs
- Schedule V
 - Drugs with medical use and low potential for abuse and that produce less physical dependence than do schedule IV drugs

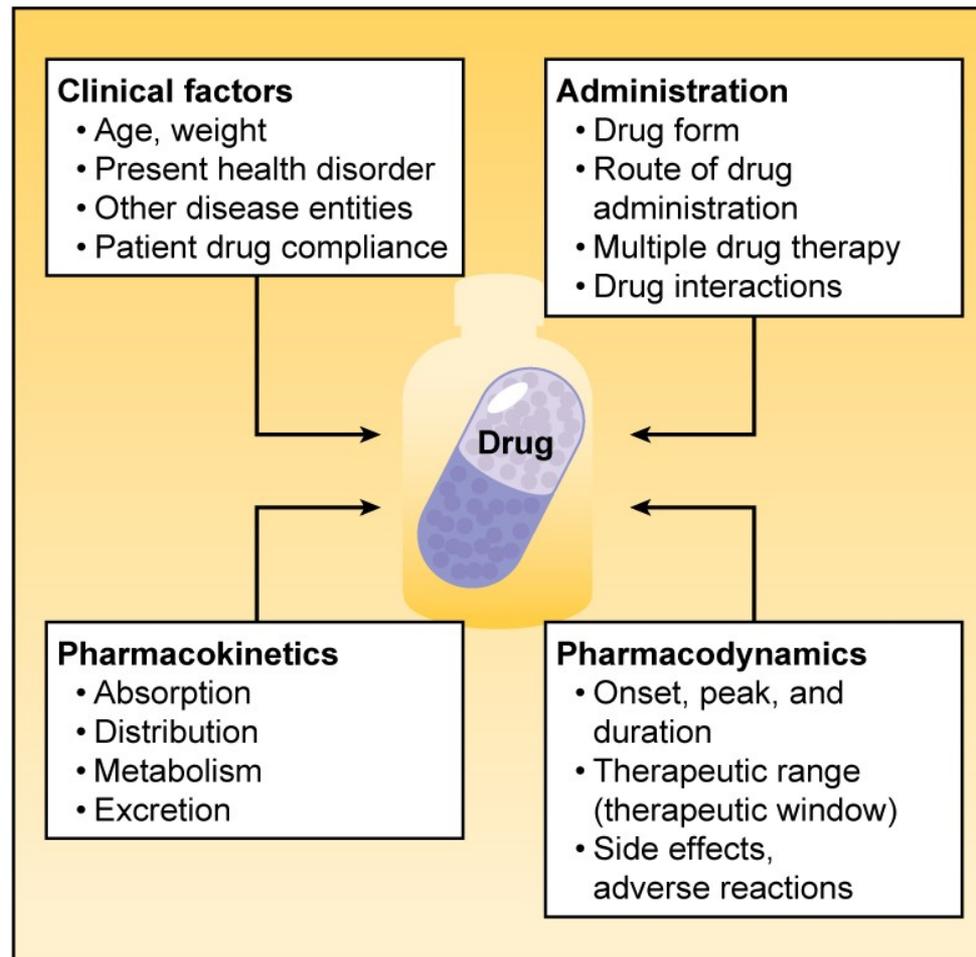
Drug Standards

- To obtain FDA approval, a drug must meet standards in five areas:
 - Purity
 - Potency
 - Bioavailability
 - Efficacy
 - Safety

Basic Concepts of Pharmacology

- Pharmacokinetics: how drugs enter the body, are metabolized, reach their site of action, and are excreted
- Absorption: rate determined by weight, age, sex, disease conditions, genetic factors, and immune mechanisms
- Distribution: distribution to tissues and site of action depends on chemical and physical properties of drug and physical status of patient

Figure 33-1: Factors affecting drug therapy



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Differences in Absorption by Route of Administration

- Skin (transdermal) Slow absorption
- Mucous membranes Quick absorption
- Respiratory tract Quick absorption
- Oral Slow absorption
- Intramuscular
of the drug Depends on the form
- Subcutaneous Slow absorption
- Intravenous Most rapid absorption

Factors Affecting Drug Action

- Biologic membranes
 - Blood-brain barrier, placental barrier
- If patient is taking two drugs that are protein-bound, one drug may have a higher concentration in an unbound state
- Decrease in kidney or liver function may result in toxic drug levels
- Inadequate fluid intake may result in decreased output resulting in drug toxicity

Drug Response and Pharmacodynamics

- Onset: Begins when the drug reaches a minimum effective concentration level
- Peak: Occurs when the highest blood or plasma concentration of the drug is achieved
- Duration: Length of time the drug exerts a pharmacologic effect
- Agonists: Drugs that produce a response
- Antagonists: Drugs that block a response

Drug Response and Pharmacodynamics (cont'd)

- Four types of drug action
 - Stimulation or depression
 - Direct action on a receptor site
 - Rate of cell activity stimulated or gland secretion increased, or cell activity depressed and function of a specific organ reduced
 - Replacement
 - Injected insulin for people who do not produce their own
 - Inhibition or killing of organisms
 - Action of an antibiotic when it blocks synthesis of the bacterial cell wall
 - Irritation
 - Such as that produced by a laxative on the colon wall, resulting in peristalsis and defecation

Drug and Food Incompatibilities

- Food in the stomach can affect the drug
 - Speed up, reduce, or even prevent the absorption of the drug into the bloodstream
 - Delays emptying of the stomach, thus may delay the onset of the therapeutic effects of the drug
 - Acidic gastric juices may affect rate of tablet breakdown
- Some drugs are incompatible with others
 - Some drug actions are accentuated by other drugs
 - Others have an additive effect
 - Other drugs may be inactivated by the other medication

Medication Administration and Safety

- Analyze physician's order and determine if the drug, dose, and timing of the drug are appropriate for the patient
- Be aware of usual dosages for an adult or child for each drug
- Responsible for monitoring laboratory results related to drug administration
- Error can be a life-threatening event for a patient, and patient safety must come first

Considerations for Infants and Children

- Dosage based on:
 - Age
 - Size
 - Weight
- Not given as a standardized amount
- Check with child's parents for the most effective, least traumatic way to give the child a medication
- Do not equate medication to candy

Considerations for the Elderly

- May have chronic medical conditions, or metabolism of drugs may be slowed
- May be on long-term antiinflammatory drugs for arthritis or may have difficulty swallowing
- May need a pill organizer to help remember to take pills
- More likely to have blood pressure fluctuations

Considerations for the Elderly (cont'd)

- May become more quickly dehydrated
- May have decreased kidney function
- May have limited financial resources
- May have limited vision
- May have had a previous stroke
- May not be able to open childproof bottles
- May be noncompliant

Considerations for Home Care

- Be certain that the patient or caregiver can open the medication bottles or dispenser
- A pill organizer may be needed
- Written instructions should be left for the patient
- Verify that patient can obtain needed medications
- If caregiver is to administer medications, thorough teaching must be performed

Question 1

Drug standards that must be met by manufacturers include all of the following *except*:

- 1) purity.
- 2) potency.
- 3) price.
- 4) safety.

Question 2

Amanda's patient is 80 years old. All of the following are considerations that must be made when administering medications to the older adult patient *except*:

- 1) elderly patients may have chronic conditions and may be taking multiple medications.
- 2) metabolism of drugs is slowed in the elderly, and normal doses may build to toxic levels easier than in the young adult.
- 3) elderly patients may need a pill organizer to help them remember which drugs to take and whether they have taken a dose.
- 4) elderly patients should have no difficulty reading labels because they usually wear glasses.

Question 3

Lola is giving her patient an oral medication. Her patient wants to know how quickly it will take effect. Lola's correct response would be:

- 1) "Your medication absorbs slowly, so it will take a while. If you do not begin to feel better in 30 minutes, please let me know."
- 2) "Your medication absorbs rapidly, so you should feel relief quickly."
- 3) "You are taking the medication in the most rapid method of administration, so it should be very quick."
- 4) "I don't have any idea."

Question 4

Heather's patient has the following ordered, Patanol bid OS. This medication would be given twice a day in:

- 1) the right eye.
- 2) the left eye.
- 3) both eyes.
- 4) both ears.

Chapter 33

Lesson 33.2

Learning Objectives

Theory

- 6) Identify measures used to prevent medication errors.
- 7) Evaluate reasons why patients may be noncompliant with drug treatment.

Learning Objectives

Clinical Practice

- 1) Locate information about a drug, including action, use, usual dosage, side effects, interactions, recommended routes of administration, and nursing implications.
- 2) Identify information the patient must be taught to safely use a drug.
- 3) Accurately calculate various drug dosages.
- 4) Demonstrate safe practices in administration of medications.
- 5) Correctly document medications that you administer.

Applying the Nursing Process

- Know what medical condition is being treated with the drug being administered
- Know the drug action and contraindications (use a drug book)
- Know whether the medication will affect vital signs (use a drug book)
- Know and assess for side effects
- Never give an unfamiliar drug (use a drug book)

Distribution of Drugs

- Medication room; rolling, locked drug cart; a computerized drug cabinet; individual storage units in the patient's room
- Stock supply
 - Drugs are in large, multidose containers
- Unit-dose systems
 - Use a portable cart with a drawer containing a 24-hour supply of drugs
- Computer-controlled dispensing system
 - Especially useful for the delivery and control of narcotics and other scheduled drugs

Problems of Noncompliance

- Reasons that patients do not take the drugs that are prescribed for them
 - Do not comprehend the action of the drug or why it is being taken
 - Cannot tolerate a side effect of the drug
 - Inability to purchase a medication
 - Do not like to have to depend on a chemical to get well or to maintain health

Six Rights

- To administer a drug, be sure you have the:
 - Right drug
 - Right dose
 - Right route
 - Right time
 - Right patient
 - Right documentation

Figure 33-4: Nurse checking the bar code on patient bracelet and on medication packet



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Figure 33-3: Pour pills from the patient's own supply into the vial cover



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Six Rules

- Review the reason for ordered medication
- Monitor the patient's response to therapy
- Teach the patient about the drugs
- Take a complete drug history
- Assess the patient for drug allergies
- Be aware of potential drug interactions with other drugs or foods

Principles of Medication Administration

- Medications given by the person preparing them
- Medications are not to be left at the bedside
- Narcotics and controlled substances kept under lock and key
- Orders must be checked before drugs are given
- Distractions must be avoided when medications are being prepared
- The nurse must know the drugs being given, their action, the dosage, and any precautions

Question 5

When Heather administers medication to her patient, which one is *not* one of the Six Rights?

- 1) Dose
- 2) Drug
- 3) Doctor
- 4) Patient