

PHARMACOLOGY



In Nursing Practice



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TERMS



- Drug
- Pharmacology
- Clinical Pharmacology
- Therapeutics/Pharmacotherapeutics

IDEAL DRUG PROPERTIES



Three most important:

- Effectiveness
- Safety
- Selectivity



IDEAL DRUG PROPERTIES



Other important properties:

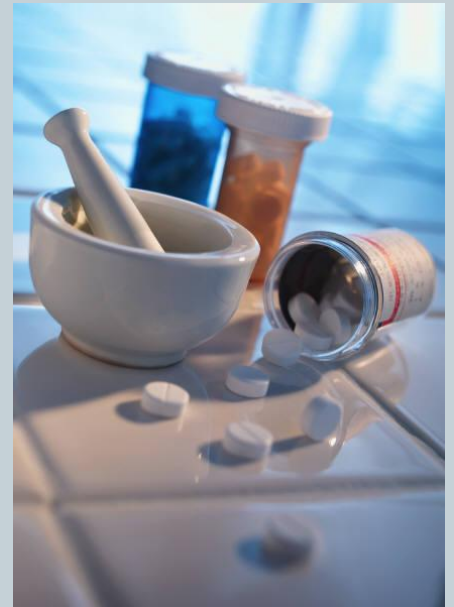
- Reversible action
- Ease of Administration
- Predictability
- Freedom from drug interactions
- Low cost
- Generic Name ease

THERAPEUTIC OBJECTIVE



➤ **Maximum Benefit**

➤ **Minimum Harm**



INTENSITY OF DRUG RESPONSES



- Administration
- Pharmacokinetics
- Pharmacodynamics
- Individual variations



PHARMACOKINETICS



➤ Body's impact on the drug. How much of the dose gets to the site of action.

- Absorption
- Distribution
- Metabolism
- Excretion



PHARMACODYNAMICS



- Impact of drug on the body
 - At site of action
 - Influenced by patient's functional state

INDIVIDUAL VARIATION



➤ Sources of Individual Variation Include

- Age
- Gender
- Weight
- Genetic Factors



ADMINISTRATION



- Right Patient
- Right Medication
- Right Dosage
- Right Route
- Right Time
- Right Documentation



NURSING RESPONSIBILITIES



- The nurse must know:
 - Appropriate medications
 - Contraindications
 - Consequences of interactions

- The nurse is the patient's advocate

PREADMINISTRATION ASSESSMENT



- Collect baseline data
 - Blood Pressure
 - Blood Sugar
- Identify High-Risk Patients
 - Allergies
 - Pregnancy



DOSAGE & ADMINISTRATION

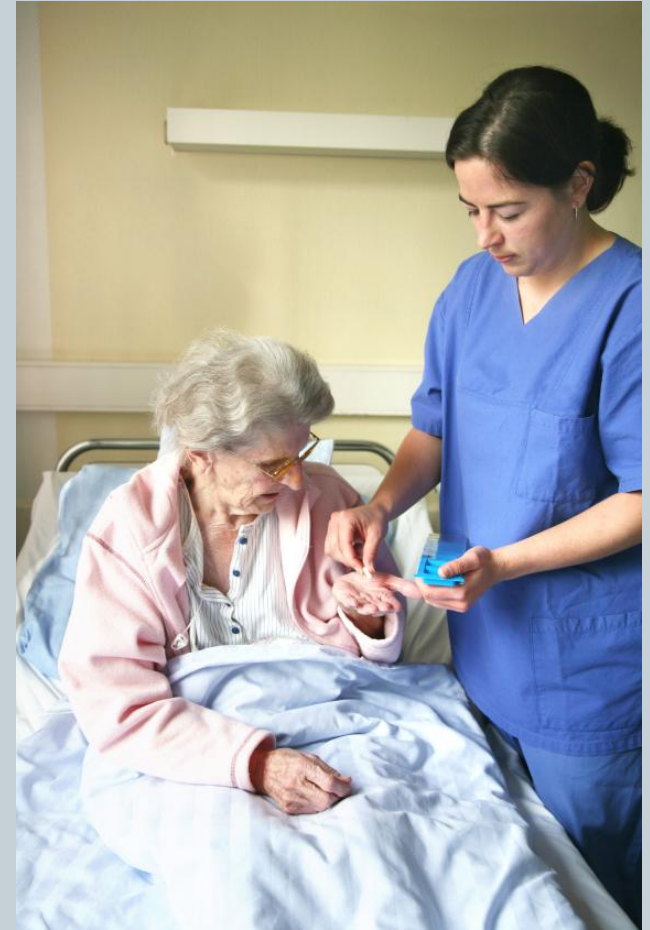


- More than one indication
- More than one route
- Read Order Carefully
- Verify Identity of the patient
- Verify Calculations
- Understand the reason for the drug's use

CAPACITY FOR SELF-CARE



- Visual acuity
- Manual dexterity
- Intellectual ability
- Memory
- Finances
- Cultural attitudes



EVALUATE THERAPEUTIC EFFECTS

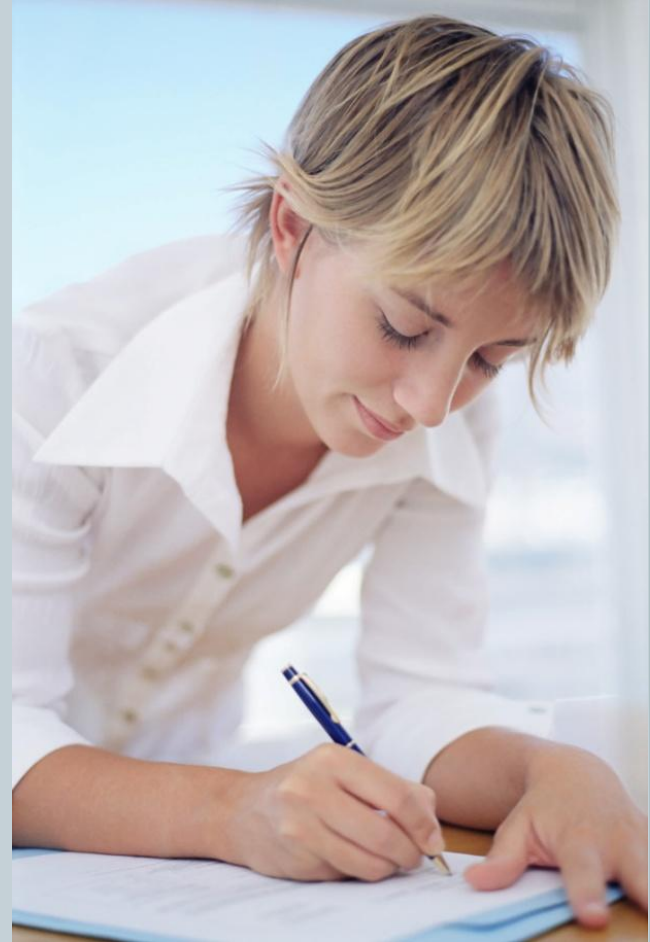


- Assess and record patient response to drug
- Promote patient's adherence to medication regime
- Utilize non-drug measures to enhance drug's effect

ANALYZE DRUG THERAPY



- **Appropriateness**
 - PRN decisions
 - Review MD order
- **Adverse Effects**
 - S/S to watch for & when
 - Interventions that help



ANALYZE DRUG THERAPY



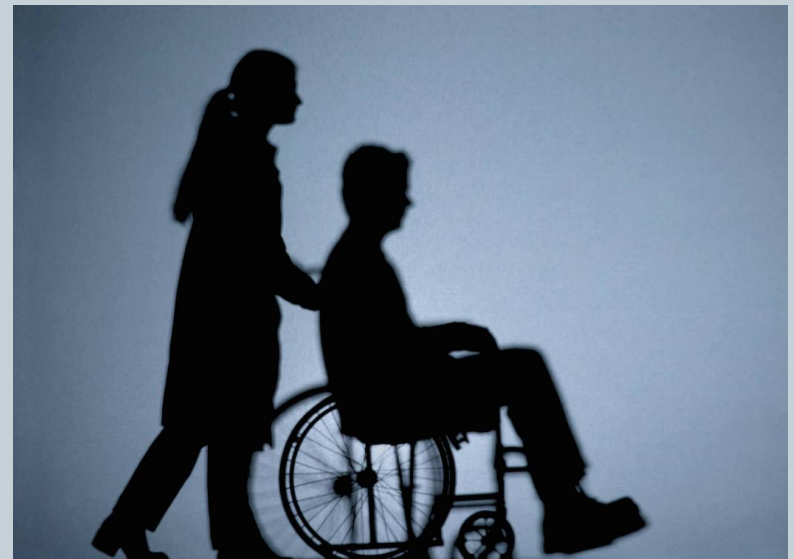
- Reduce drug interactions
 - Knowledge
- Toxicity
 - Know S/S of toxicity



PATIENT EDUCATION



- Drug name/size schedule
- Route –how to take
- Major drug & food related interactions
- S/S adverse effects
 - What to do
- Who and when to call with problems



Drug Regulation



- Federal Pure Food and Drug Act of 1906
- Food Drug and Cosmetic Act 1938
- 1962 Amendment to the Food Drug/Cosmetic Act
- Controlled substance Act 1970
- 1992 Accelerated approval laws (cancer and AIDS)



New Drug Development



- Controlled Trials
- Clinical Testing
- Exercising discretion regarding new drugs
- Benefits vs. Risks



Drug Names



- Chemical Name
- Generic Name
- Trade Name

N-acetyl-para-aminophenol
Acetaminophen
Tylenol



Over The Counter Drugs



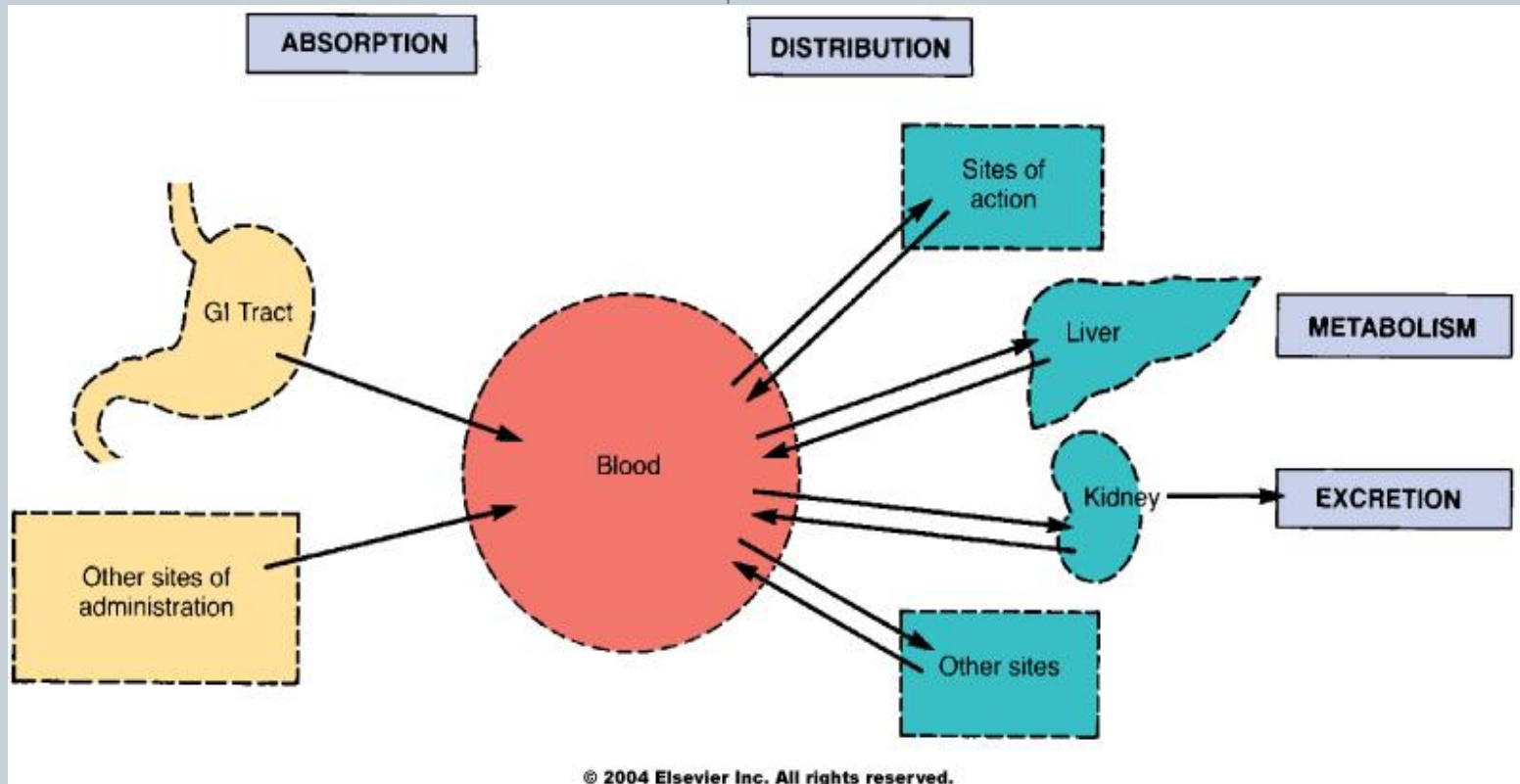
- The average home medicine cabinet contains 24 OTC preparations
- Americans spend 20 billion dollars annually on OTC preparations



PHARMACOKINETICS

- Absorption
- Distribution

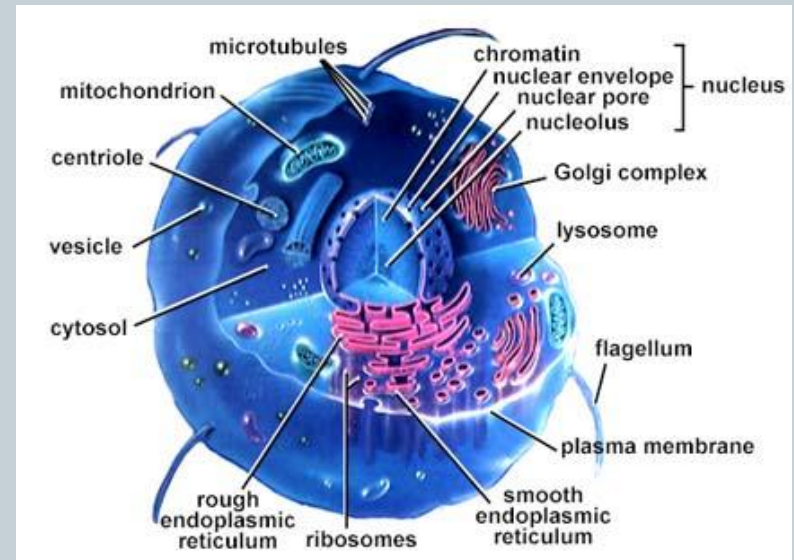
- Metabolism
- Excretion



CROSSING THE MEMBRANE



- Drug movement occurs in all four steps of pharmacokinetics
 - Channels and Pores
 - Transport Systems
 - Direct Penetration



FACTORS AFFECTING ABSORPTION



- Rate of dissolution
- Surface area
- Blood flow
- Lipid solubility
- pH partitioning



ROUTES OF ADMINISTRATION



- **Enteral**
 - Via gastrointestinal tract
- **Parenteral**
 - Outside the GI tract
 - Inhalation, transdermal, transmucosal, injection, etc.



Routes of Administration



- Intravenous
- Intramuscular
- Subcutaneous
- Oral
- Rectal



DISTRIBUTION



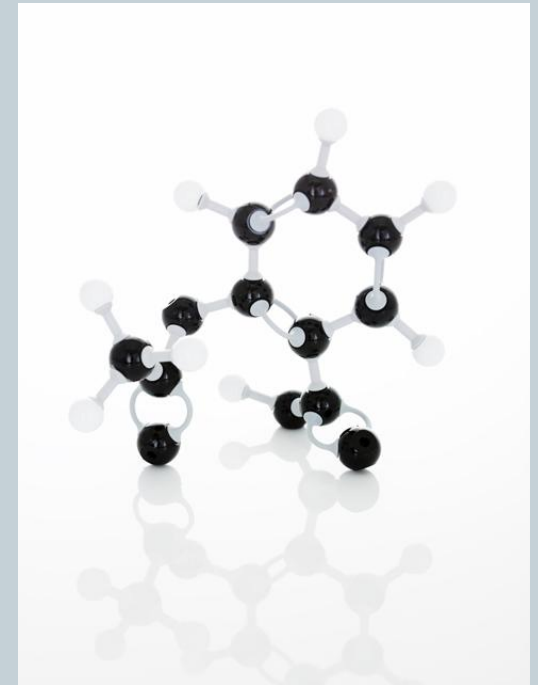
- Blood flow to tissue
- Leaving the vascular system
 - Blood brain barrier
 - Placental drug transfer
- Entering the cells



DRUG METABOLISM



- Biotransformation
 - Enzymatic alteration of drug structure
- Liver
 - Primary site



THERAPEUTIC EFFECTS OF METABOLISM



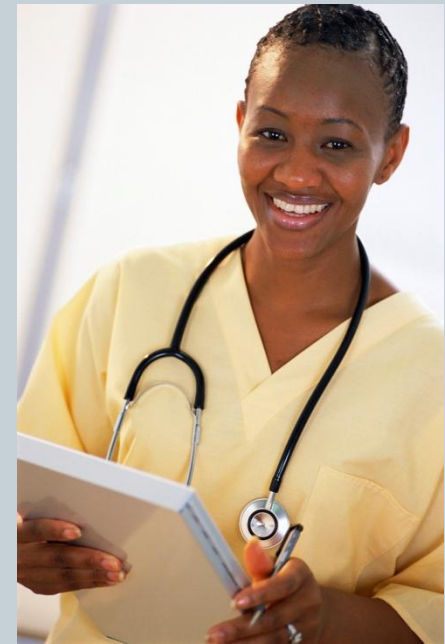
- Accelerated renal excretion (most important)
 - Decreasing lipid solubility
- Inactivates drugs
- Increases therapeutic action
- Activates prodrugs
- Increases or decreases toxicity

SPECIAL CONSIDERATIONS



➤ Individual Factors

- Age, Body Mass, Gender, Genetics, Environment, Fluids
- First-pass effect
- Nutritional status
- Competition between drugs



EXCRETION OF DRUGS



- Drug excretion is defined as the removal of drugs from the body
 - Urine
 - Bile
 - Sweat
 - Saliva
 - Breast milk
 - Expired air

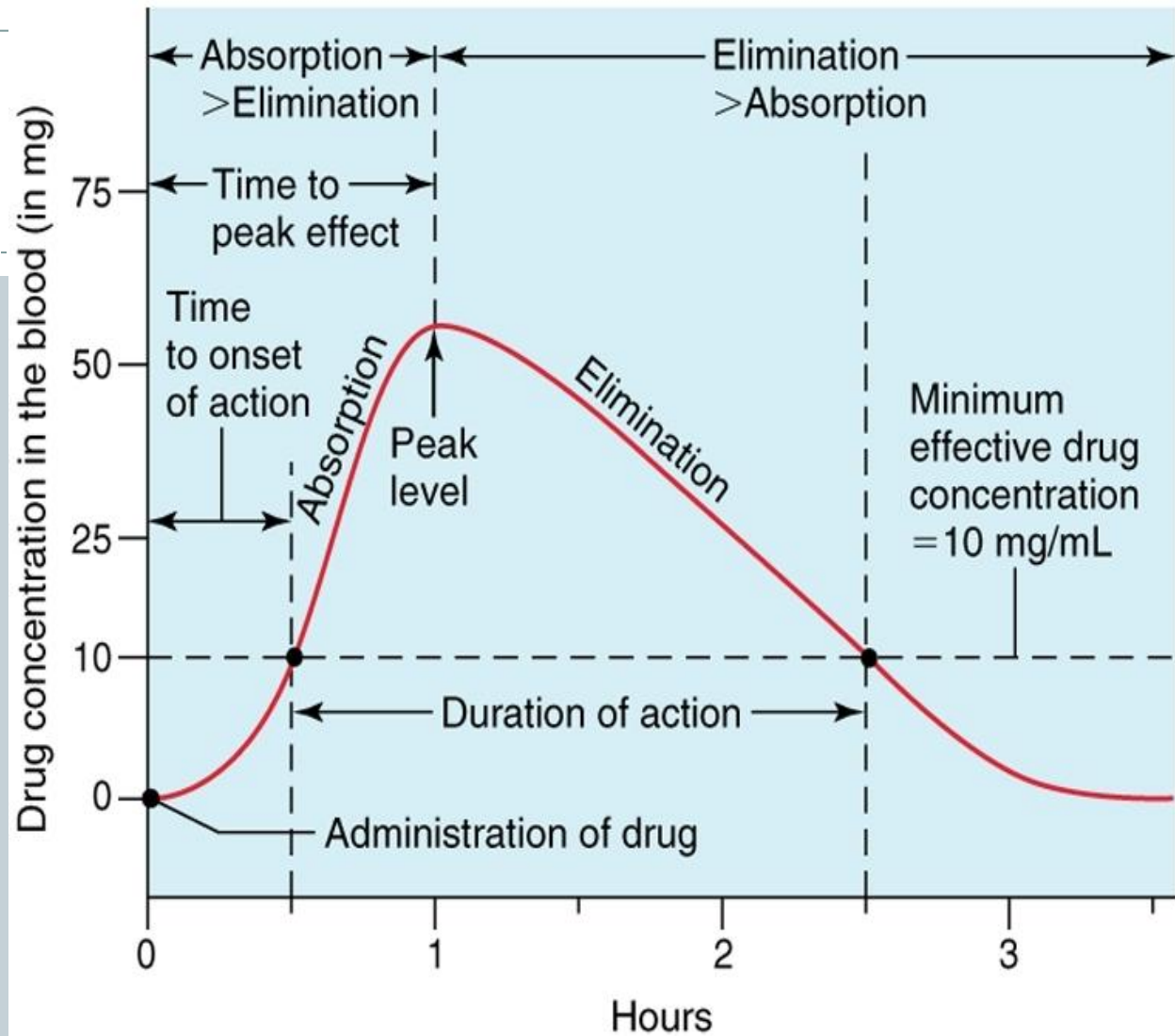


PLASMA DRUG LEVELS



- Levels in blood correlate with therapeutic and toxic responses
 - Toxic
 - Not therapeutic
- Therapeutic Range
 - Peak Level
 - Trough Level
- Drug Half-Life

Blood Concentration



Onset of action = 30 minutes
Peak effect = 1 hour
Duration of action = 2.0 hours

PHARMACODYNAMICS



- How drugs effect the body
 - Biochemical and physiologic effects
 - Dose-response relationship
- Receptor Activation
 - Blocking
 - Enhance Receptor Activation
 - Agonist vs. Antagonist

DRUG-DRUG INTERACTIONS



- **Consequences**
 - Intensification or reduction of effects
- **Pharmacodynamic interactions**
- **Clinical Significance**
- **Minimizing Adverse Interactions**

CONSEQUENCES



Three possible outcomes

1. Intensification of effects (potentiative)
2. Reduction of effects (inhibitory)
3. New response

Pharmacodynamic Interactions

- At the same receptor
- At separate sites
- Combined toxicity

CLINICAL SIGNIFICANCE



- Average hospitalized patient takes 6-10 drugs
- Drugs with narrow therapeutic range
- Unusual symptoms
- Minimize adverse reactions

DRUG-FOOD INTERACTIONS



- Similar effect as drug interactions
- Timing of drug administration
 - At bedtime
 - In morning
 - With meals or not

DRUG-FOOD EXAMPLES



- Grapefruit juice effect
- MAOI's
 - Tryamine rich foods



ADVERSE REACTIONS



➤ Mild

- Drowsiness
- Nausea
- Vomiting
- Itching, rash

➤ Severe

- Neutropenia
- Respiratory depression



ADVERSE REACTIONS



- Side effect
- Toxicity
- Allergic reaction
- Physical dependence
- Carcinogenic effect
- Teratogenic effect



IDENTIFYING REACTIONS



- Did symptoms appear shortly after the drug was first used?
- Did symptoms abate when the drug was discontinued?
- Did symptoms reappear when the drug was reinstated?
- Is the illness itself sufficient to explain the event?
- Are other drugs in the regimen sufficient to explain the event?



MINIMIZE ERRORS

- Definition of a medication error and who makes them
- Types of medication errors
- Causes of medication errors
- Ways to reduce medication errors
- Reporting



CLASSIFICATIONS



- Categorize medications
- Medications in the same classification often have similarities in the generic names
- Relate to a disease or disease process

CLASSIFICATIONS



➤ Anticoagulants

- Prevent clot formation
- Contraindications: bleeding and pregnancy/lactation
- Precautions: bleeding
- Interactions:
 - Drugs that cause bleeding
- Nursing Implications
 - Watch for signs of bleeding
- Commonly Used
 - heparin and warfarin (Coumadin)



CLASSIFICATIONS



➤ Antidiabetic

- Lowers blood glucose
- Contraindications: hypoglycemia and pregnancy
- Precautions:
 - Factors that may alter requirements (cause hypoglycemia)
- Interactions:
 - Drugs that may increase or decrease effects
- Nursing Implications
 - Watch for signs of hypoglycemia
- Commonly Used
 - Metformin and gipizide (Glucotrol)

CLASSIFICATIONS



➤ Antihypertensives

- Lowers blood pressure
- Contraindications: hypersensitivity (lowers BP)
- Precautions:
- Pregnancy/lactation and sudden stop may increase BP
- Interactions:
 - Drugs that negate therapeutic effectiveness
- Nursing Implications
 - Monitor BP

CLASSIFICATIONS



➤ Antihypertensives

➤ Commonly used:

- ACE inhibitors
 - captopril
 - lisinopril
- Beta Blockers
 - propranolol
 - metropolol
- Calcium Channel Blockers
 - Verapamil
- Thiazide Diuretics
 - hydrochlorothiazide



CLASSIFICATIONS



➤ Diuretics

- Treat edema and antihypertension
- Contraindications: hypersensitivity (dehydration)
- Precautions: renal or hepatic disease, pregnancy
- Interactions:
 - Potassium wasting and potassium sparing
- Nursing Implications
 - Monitor weight, assess for electrolyte imbalance,
- Commonly Used
 - furosemide (Lasix)

