PHARMACOLOGY
UNIT V
ADN Program
N141
Napa Valley College

PHARMACOLOGY

• DEFINITION
• THE STUDY OF DRUGS (CHEMICALS) and their origin, nature, properties, and effects on living organisms.

PURPOSE:
ADMINISTERED TO PREVENT, DIAGNOSE, OR TREAT DISEASE, OR TO RELIEVE SIGNS AND SYMPTOMS

SOURCES OF DRUGS

• Historically derived from plants or animals
• Now most drugs are synthetic chemical compounds manufactured in laboratories.
• Available in a variety of forms or preparations
Pharmacological Concepts

- Drug names:
  - Chemical, generic, trade
- Classification
- Medication forms:
  - Solid, liquid, other oral forms, topical, parenteral, instillation into body cavities

Scientific Knowledge Base

- To safely and accurately administer medications you need knowledge related to:
  - Pharmacology
  - Pharmacokinetics
  - Life sciences
  - Human anatomy
  - Mathematics

Medication Legislation and Standards

- Federal regulations
- State and local regulation of medication
- Health care institutions and medication laws
- Medication regulations and nursing practice
CONTROLLED SUBSTANCES ACT

• 1970-SET STRICT CONTROLS ON MANUFACTURE AND DISTRIBUTION OF CONTROLLED MEDICATION
• ESTABLISHED PROGRAMS TO PROMOTE PREVENTION AND TREATMENT OF MEDICATION DEPENDENCE

NURSING IMPLICATION

• NARCOTIC VIOLATIONS OF THE CONTROLLED SUBSTANCE ACT ARE PUNISHABLE:
  1. BY FINES
  2. IMPRISONMENT
  3. LOSS OF NURSE LICENSURE

Pharmacokinetics

• The study of how medications:
  — Enter the body
  — Are absorbed and distributed into cells, tissues, or organs
  — Alter physiological functions
  — Are excreted
Absorption
- The passage of medication molecules into the blood from the site of administration
- Factors that influence absorption:
  - Route of administration
  - Ability to dissolve
  - Blood flow to site of administration
  - Body surface area
  - Lipid solubility of medication

Distribution
- After absorption, distribution occurs within the body to tissues, organs, and to specific sites of action.
- Distribution depends on:
  - Circulation
  - Membrane permeability
  - Protein binding

Metabolism
- Medications are metabolized into a less potent or an inactive form.
- Biotransformation occurs under the influence of enzymes that detoxify, degrade, and remove active chemicals.
- Most biotransformation occurs in the liver.
Excretion

- Medications are excreted through:
  - Kidney
  - Liver
  - Bowel
  - Lungs
  - Exocrine glands

Types of Medication Action

<table>
<thead>
<tr>
<th>Therapeutic effect: Expected or predictable</th>
<th>Side effect: Unintended, secondary effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adverse effect: Severe response to med</td>
<td>Toxic effect: Medication accumulates in the blood stream</td>
</tr>
<tr>
<td>Idiosyncratic reaction: Over- or under-reaction to a medication</td>
<td>Allergic reaction: Unpredictable response to a medication</td>
</tr>
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Medication Interactions

- Occur when one medication modifies the action of another
- Antagonism
  - Effects of two drugs that cancel each other
- Synergism or potentiation:
  - Two drugs with different mechanisms of action produce greater effects.
Medication Interaction

- Food Interactions
  - Food is known to increase, decrease or delay drug absorption
  - Food can bind with drugs, causing less or slower drug absorption.
  - Some foods may modify the action

Medication Dose Responses

<table>
<thead>
<tr>
<th>Serum half-life: Time for serum medication concentration to be halved</th>
<th>Onset: Time it takes for a medication to produce a response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peak: Time at which a medication reaches its highest effective concentration</td>
<td>Trough: Minimum blood serum concentration before next scheduled dose</td>
</tr>
<tr>
<td>Duration: Time medication takes to produce greatest result</td>
<td>Plateau: Blood serum concentration is reached and maintained</td>
</tr>
</tbody>
</table>

Routes of Administration

<table>
<thead>
<tr>
<th>Oral</th>
<th>Parenteral</th>
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</thead>
<tbody>
<tr>
<td>Sublingual, buccal, ODT's</td>
<td>ID, Sub-Q, IM, IV</td>
</tr>
<tr>
<td>Epidural, Intrathecal, Intraosseous, Intrapertoneal, Intrapleural, Intraarterial</td>
<td>Topical</td>
</tr>
<tr>
<td>Inhalation</td>
<td>Intraocular</td>
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</table>
Systems of Medication Measurement

- Requires the ability to compute medication doses accurately and correctly
- Metric system
- Household system
- Solution

Nursing Knowledge Base

- Safe administration is imperative.
- Nursing process provides a framework for medication administration.
- Clinical calculations must be handled without error.
  - Conversions in and between systems
  - Dose calculations
  - Pediatric and elderly calculations

Prescriber’s Role

- Prescriber can be physician, nurse practitioner, or physician’s assistant.
- Prescribers must document the diagnosis, condition, or need for each medication.
- Orders can be written, verbal, or by telephone.
Types of Orders

1. Standing Order or Routine Medication order
2. prn orders
3. Single one-time orders
4. STAT orders
5. Now orders
6. Prescriptions

A. To be given when client requires it.
B. To be given only once
C. Given until the dosage is changed or another med prescribed
D. When a med is needed right away but not STAT
E. Med to be taken outside the hospital
F. Given immediately in an emergency.

Medication Administration

• Pharmacist’s role
• Distribution system
• Nurse’s role
• Medication error

Critical Thinking and Medication Administration

• Knowledge
• Experience
• Attitudes
• Standards
Nursing Process and Medication Administration

- Assessment
- Diagnosis
- Planning
- Implementation
- Evaluation

Medication Administration

- Oral
- Topical
- Inhalation
- Irrigation
- Parenteral
- Injections

NURSING IMPLICATIONS continued...

- The nurse is responsible for knowing as much as possible about each medication given
- BE FAMILIAR WITH:
  - DRUG NAMES GENERIC & TRADE
  - SYSTEMS OF MEASUREMENT
  - MEDICAL TERMINOLOGY
  - ABBREVIATIONS USED
Patient Related

• Age-
  – Infants and Children
  – Older Adults
  • Polypharmacy

• Weight/body size-

Patient Related

• **Diversity**
  – Genetic
  – Ethnic
  – Gender
  – Pathologic
  – Psychological

Drug Therapy Guidelines

• Guidelines for choosing drugs, route and time
• Check for allergies
• Check medication order with health care provider’s order
• Check label on drug container three times
• Check expiration date on drug label
• Recheck drug calculation
• Verify dose of drugs that are potentially toxic with another nurse
• Pour tablet into cap of drug container
• Open unit dose at bedside
Drug Therapy Guidelines

- Administer only meds you have prepared
- Identify client by ID band
- Stay with client until the medications are taken
- Administer no more than 2.5–3 ml of solution IM at one site
- Infants receive no more that 1 ml IM at one site
- Chart drug given, dose, time, route, and your initials
- Record effectiveness/results of medication
- Report amount of fluid taken with medications on input and output chart

The End