Chapter 6, Part 1 GENERAL PRINCIPLES OF PHARMACOLOGY

Part 1 Basic Pharmacology

Drugs are chemicals used to diagnose, treat, and __________________________ disease.

Pharmacology is the study of drugs and their __________________________ on the body.

History of Pharmacology

Pharmacology, beginning with the use of herbs and minerals to treat the sick and injured, has been documented as long ago as ________________ B.C.

17th and 18th Century
• Tinctures of _____________________________, coca, and digitalis
• _____________________________ inoculation in 1796

19th Century
• _____________________________
• Chloroform
• Codeine
• Ether
• _____________________________

The Present
• ___________ technology
  - Human _____________________________
  - tPA
• Many medications that were once prescription are now over the counter (___________)

Basic Pharmacology

Names of Drugs
• _____________________________: states its chemical composition and molecular structure.
• _____________________________: usually suggested by the manufacturer.
• Official: as listed in the U.S. Pharmacopeia.
• Brand: the trade or proprietary name.

Sources of Drugs
• _____________________________
• Animals
• _____________________________
• Lab _____________________________

Sources of Drug Information
• United States Pharmacopeia (___________)
• Physician’s desk reference (___________)
• Drug information
• Monthly prescribing reference
Components of a Drug Profile

- Classification
- Mechanism of Action
- Pharmacokinetics
- Effects
- Routes of Administration
- Dosage
- How Supplied
- Considerations

Names
- Most Frequently Include and Trade Names

Classification
- The broad group to which a drug . Knowing classifications is essential to understanding the properties of drugs.

Mechanism of Action
- The way in which a drug causes its effects; its .

Indications
- that enable the appropriate administration of the drug (as approved by the FDA).

Pharmacokinetics
- How the drug is , distributed, and eliminated; typically includes onset and duration of action.

Side Effects/Adverse Reactions
- The drug’s untoward or effects.

Routes of Administration
- How the drug is .

Contraindications
- Conditions that make it to give the drug.
- ...means a predictable harmful event will occur if the drug is given in this situation.

Dosage
- The of the drug that should be given.

How Supplied
- This typically includes the common of the available preparations; many drugs come in different concentrations.
- Example: D50W is supplied as grams in 50cc (0.5gm/cc)

Special Considerations
- How the drug may affect ____________________________, geriatric, or pregnant patients.

Legal
- Knowing and obeying the laws and regulations governing medications and their administration is an important part of a paramedic's career.
- These include ____________________________, state, and agency regulations.
- You must know the indications, contra-indications, ____________________________, desired effects and side effects of ALL medications you can administer.

Federal Drug Legislation
- Pure Food & Drug Act of 1906
- Harrison Narcotic Act of 1914
- Federal Food, Drug, & Cosmetic Act of 1938
- Comprehensive Drug Abuse Prevention & Control Act of 1970

Pure Food & Drug Act of 1906
- Improved the quality and ____________________________ of drugs
- Named the United States ____________________________, as the official source for drug information

Harrison Narcotic Act of 1914
- Limited the indiscriminate use of ____________________________, drugs regulating the importation, manufacture, sale, and use of opium, cocaine, and their compounds or derivatives

Federal Food, Drug, & Cosmetic Act of 1938
- Empowered the Food and Drug Administration (FDA) to enforce and set ____________________________ safety for drugs
- The Durham-Humphrey Amendments to this Act (1951) required pharmacists to have a ____________________________ or verbal prescription from a physician to dispense certain drugs
  - Also created OTC classification

Comprehensive Drug Abuse Prevention & Control Act of 1970
- AKA Controlled ____________________________ Act
- Repealed and replaced the Harrison Narcotic Act
- Created __________ schedules of controlled substances, each with its own level of control and record keeping requirements

Schedule I Drugs
- ____________________________ abuse potential
- May lead to severe dependence
- Normally used only for ____________________________, analysis, or instruction only
  - ____________________________, LSD, Mescaline

Schedule II Drugs
- ____________________________ abuse potential
- May lead to severe dependence
- Has ____________________________ medical indications
- Opium, cocaine, ____________________________, codeine, oxycodone,
methadone, secobarbital

**Schedule III Drugs**
- Less abuse potential
- May lead to ________________________________ or low physical dependence
- Accepted medical indications
- Vicodin, Tylenol with ________________________________

**Schedule IV Drugs**
- Low abuse potential
- May lead to moderate psychological and/or physical dependence
- Accepted medical indications
- ________________________________, Lorazepam, Phenobarbital

**Schedule V Drugs**
- Lower abuse potential
- May lead to ________________________________ physical or psychological dependence
- Accepted medical indications
- Limited amounts of opioids, usually for ________________________________ or diarrhea

**State and Local Standards**
- They vary widely.
- All states allow medical control physician to ________________________________ authority to administer certain medications through written, verbal, or standing orders
- Always consult local protocols and with medical direction for guidance in securing and distributing ________________________________ substances.

**Standards**
- Set by the ________________________________
- ________________________________ : determines the amount and purity of a given chemical in a preparation in the lab
- Bioequivalence: relative therapeutic effectiveness of chemically equivalent drugs
- ________________________________ : test to ascertain a drug’s availability in a biological model
- The United States Pharmacopia (USP) is the official standard for the US

**Providing Patient Care Using Medications (1 of 4)**
- Know the ________________________________ and contraindications for all medications you administer.
- Practice ________________________________ technique.
- Know how to observe and ________________________________ drug effects.

**Providing Patient Care Using Medications (2 of 4)**
- Maintain a current knowledge in ________________________________ .
- Establish and maintain professional relationships with other ________________________________ providers.
- Understand pharmacokinetics and pharmacodynamics.

**Providing Patient Care Using Medications (3 of 4)**
- Have current medication references available.
- Take careful drug ________________________________ including:
- Name, strength, dose of prescribed medications;
- Over-the-counter drugs;
- Vitamins;
- Herbal medications/folk remedies;
- ____________________________________.

Providing Patient Care Using Medications (4 of 4)
- Evaluate the patient's ____________________________ , dosage, and adverse reactions.
- Consult with medical direction as needed.

Know the 6 Rights of Medication Administration
- Right ____________________________
- Right ____________________________
- Right ____________________________
- Right ____________________________
- Right ____________________________
- Right ____________________________

Special Considerations
- ____________________________ Patients
- Pediatric Patients
- ____________________________ Patients
- When in doubt about how a medication will effect the patient, Contact Medical ____________________________ !

Pregnant Patients
- Ask the patient if there is a possibility that she could be pregnant.
- Some drugs may have an adverse effect on the ____________________________ of a pregnant female.
- ____________________________ drug...is a medication that may deform or kill the fetus.

Pediatric Patients
- Slower ____________________________ of oral medications
- Because children up to a year old have diminished ____________________________ protein concentrations, drugs that bind to proteins have higher free drug availability—a greater proportion of the drug will be available in the body to cause either desired or undesired effects
- Drug function can be radically ____________________________ from an adult

Geriatric Patients
- Absorb oral medications ____________________________
- Smaller ____________________________ masses
- Depressed ____________________________ function may delay or prolong drug actions
- Commonly takes ____________________________ medications increasing the risk of reactions

Pharmacokinetics
The study of the basic processes that determine the duration and intensity of a drug's effect
These 4 Processes are:
Pharmacokinetics

- Distribution: drug must find its way to the site of action.
- Biotransformation: the process of breaking down, or metabolizing, drugs.
- __________________________: drugs must eventually be excreted from the body.

Drug Routes (1 of 2)

- Enteral and Parenteral: deliver medications by absorption through the ________________ tract.
- Oral, orogastric/nasogastric, sublingual, buccal, rectal.

Drug Routes (2 of 2)

- Delivers medications via routes other than the GI tract.
- Include __________________________, endotracheal, intraosseous, umbilical, intramuscular, subcutaneously, inhalation, topical.

Enteral – Examples (1 of 2)

- __________________________(PO) — good for self-administering drugs.
- __________________________(OG) / Nasogastric (NG) — alternate method to providing PO medications.
- __________________________(SL) — excellent absorption without problems of gastric acidity.

Enteral – examples (2 of 2)

- __________________________ — between the cheek/gum. Similar to sublingual.
- __________________________(PR) — reserved for unconscious or vomiting patients.

Parenteral – examples (1 of 3)

- __________________________(IV) — preferred route in emergencies.
- __________________________(ET) — alternate route in emergencies for select medications.
- __________________________(IO) — alternative use in emergencies.

Parenteral – examples (2 of 3)

- __________________________ — provides alternate access in newborns.
- __________________________(IM) — slower absorption than IVs.
- __________________________(SQ) — slower absorption than IM.

Parenteral – examples (3 of 3)

- __________________________ — very rapid absorption via the lungs.
- __________________________ — delivers drugs directly to the skin.
Most emergency medications are given to avoid drug degradation in the liver.

Drug Forms

- Such as pills, powders, suppositories, capsules, tablets.
- Such as solutions, tinctures, suspensions, emulsions, spirits, elixirs, syrups.

Solid Forms

- Drugs shaped spherically to be swallowed.
- Powders—not as popular as they once were.
- Powders compressed into disk-like form.
- Suppositories—drugs mixed with a wax-like base that at body temperature.
- Capsules—containers filled with powders or tiny pills.

Liquid Forms (1 of 2)

- Water or oil-based.
- Tinctures—prepared using an extraction process.
- Preparations in which the solid does not dissolve in the solvent.
- Suspensions with an oily substance in the solvent.

Liquid Forms (2 of 2)

- Solution of a volatile drug in alcohol.
- Alcohol and water solvent; often with flavoring.
- Sugar, water, and drug solutions.

Drug Storage

All drugs must be stored according to certain specifications

- Temperature
- Sensitivity to
- Sensitivity to

Actions of Drugs

- Drugs that Act by Binding to a Site
- Drugs that Act by Changing Physical Properties
- Drugs that Act by Chemically with Other Substances
- Drugs that Act by Altering a Normal Metabolic Pathway

Drugs that Act by Binding to a Receptor Site (1 of 2)

- Most:
  - Specialized protein that combines with a drug resulting in the biochemical effect
  - Force of attraction between a drug and a
Drugs that Act by Binding to a Receptor Site (2 of 2)

- **Drug’s ability to cause the expected response**
  - Drug that binds to a receptor and causes it to initiate the expected response
  - Drug that binds to a receptor but does not cause it to initiate the expected response
  - Agonist-antagonist: drug binds to a receptor and stimulates some of its effects but other actions
    - Nubain (stops pain but does not depress respirations)

Other Actions of Drugs

- Drugs that act by physical properties
  - Mannitol
- Drugs that act by chemically interacting with other substances
  - Antacids
- Drugs that act by interacting with normal metabolic pathway
  - Some cancer drugs

Responses to Drug Administration (1 of 5)

- **Effect—unintended response to a drug.**
  - Allergic Reaction—drug effect unique to an individual.

Responses to Drug Administration (2 of 5)

- Tolerance—decreased response to the same amount.
  - Cross tolerance for a drug that develops after administration of a different drug.
- Rapid occurring tolerance to a drug.

Responses to Drug Administration (3 of 5)

- **Effect—increased effectiveness when a drug is given in several doses.**
  - Drug—the patient becomes accustomed to the drug’s presence in his body.
  - Drug—the effects of one drug alter the response to another drug.
  - Drug—the effects of one drug block the response to another drug.

Responses to Drug Administration (4 of 5)

- **Also known as additive effect, two drugs with the same effect are given together—similar to 1+1=2.**
  - Ex: Demeral and Phenergan
- **Two drugs with the same effect are given together and produce a response greater than the sum of their individual responses—similar to 1+2=3.**
  - Ex: Viagra and Nitroglycerin
Responses to Drug Administration (5 of 5)

- ____________________________—one drug enhances the effect of another.
- ____________________________—the direct biochemical interaction between two drugs; one drug affects the pharmacology of another drug.

Factors Affecting Drug Response

1. Age
   - ____________________________ Mass
2. ____________________________ of Administration
   - Pathology (diseases)
   - ____________________________
   - Psychology (mental state)

Drug Interactions

- Drug interactions occur whenever two or more drugs are available in the same patient.
- The interaction can increase, ____________________________, or have no effect on their combined actions.