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.

Names of Drugs

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

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

- 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.

27  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.

28  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

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

30  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

31  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

32  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

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

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

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

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

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

38 **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.

39 **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

40 **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.

41 **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.

42 **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 affect 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
- Biotransformation
- Pharmacokinetics: drug must find its way to the site of action.
- Biotransformation: the process of breaking down, or metabolizing, drugs.
- Distribution: a drug must then be distributed throughout the body.
- Biotransformation: drugs must eventually be excreted from the body.

Drug Routes (1 of 2)

- Enteral and Parenteral
  - Deliver medications by absorption through the GI 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.
- Drugs mixed with a wax-like base that ______________________________________ at body temperature.
- Containers filled with powders or tiny pills.

**Liquid Forms (1 of 2)**
- Water or oil-based.
- 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
receptor

- ___________________________ : drug’s ability to cause the expected response

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

- ___________________________ : 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 ____________________________ others
  - ___________________________
  - Nubain (stops pain but does not depress respirations)

Other Actions of Drugs

- Drugs that act by ____________________________ physical properties
  - Mannitol
- Drugs that act by chemically ____________________________ with other substances
  - Antacids
- Drugs that act by ____________________________ 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.
- ____________________________—rapidly 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+1=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
2. ____________________________ Mass
   - Sex
   - Environment
   - ____________________________ 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.