Principles of Pharmacology
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Objectives:

• Distinguish government agencies that regulate drugs in the USA.

• List DEA regulations and the five scheduled controlled substances.

• Explain the role of the MA in preventing Drug Abuse.

• Differentiate a drugs chemical, generic, and trade names.

• Demonstrate the ability to transcribe a prescription accurately.
Clinical Pharmacology

• Study of the biological effects of a drug on a patient and the actions of the drug over time

• Medical assistants must understand:
  – Drug action
  – Typical side effects
  – Route of administration
  – Recommended dose
  – Individual patient factors that can alter the drug’s effect and elimination

• Be prepared to provide safe drug therapy patient education.
Government Regulation

Several federal agencies regulate drugs in the United States.

- **FDA** regulates development and sale of prescription drugs and OTCs.
- **DEA** enforces federal laws designed to control drug abuse and also educates the public on drug-abuse prevention.
- **FTC** regulates OTC advertisement.
Drug Names

- A single drug may have as many as three names: chemical, generic, and trade.
- **Chemical** name is the drug’s formula.
- **Generic** or official name is assigned to the drug and may reflect the chemical name. Is not protected by copyright law.
- The **trade** or brand name is the name given the compound by the developing pharmaceutical company and is protected by copyright for 17 years.
Generic Drug Standards

- Generic must have the same active ingredients, labeled strength, route of administration, and dosage form.
- Do not have to replicate the human clinical trials but must prove the product performs exactly as the brand-name version.
- Generic must deliver the same amount of active ingredient into the bloodstream in the same amount of time.
- Label must contain the same information.
- Manufacturing process must have comparable quality and production standards.
- FDA has found no difference in rates of side effects between brand name and generic drugs.
Drug Abuse

• Patients may misuse or abuse prescription, OTC, and illegal drugs.
• Drug dependence—incapacity to function unless under the influence of the substance.
  – Can have acute and chronic effects
  – Physical dependence (addiction)—biochemical changes within the body that require the substance to be used continuously in order for the person to function and to avoid physical discomfort
  – Psychological dependence—compulsive craving for the substance
    • Habituation—mild form (caffeine)
Prevention of Drug Abuse

• Monitor patients who repeatedly call for controlled substance prescription refills.
• Request medical records for patients with a history of controlled substance use.
• Keep prescription pads in a safe place.
• Store limited amount of controlled substances in office.
• Maintain complete and accurate records; keep patient records accurate and complete.
Learning about Drugs

• Take opportunities to observe the use of drugs in patient care.

• Concentrate on the most important drugs in each classification.

• Learn about a drug’s primary action and use, then expand your knowledge to its other actions and uses.
Drug Use Terminology

- **Diagnostic** — determines the cause of a particular health problem
- **Palliative** — does not cure but provides relief from pain or symptoms related to the disorder
- **Prophylaxis** — prevents occurrence of a condition
- **Replacement** — provides substances needed to maintain health
- **Therapeutic** — used to treat the disorder and cure it
Dispensing Drugs: Over-the-Counter Drugs

- OTC drugs may interfere or interact with prescription drugs.
- Gather information about OTC use at each office visit.
- Patient education for safe use of OTCs:
  - Carefully read label and insert for use guidelines.
  - Take only the recommended dose.
  - Discard when expired.
  - Inform the physician of OTC use.
  - Be aware of OTC contraindications.
  - Check with pharmacist if you have questions.
Dispensing Drugs: Prescription Drugs

• Written order by a physician for the dispensing and administration of a drug for a particular patient.
• Must be signed by a physician to be legal.
• MA may phone in a prescription to a pharmacy, but the order must first be written down and reviewed by the physician for accuracy.
• Phoned order must be documented on the patient chart as a record of the medication.
• The MA may write a prescription dictated by the physician, but the physician must review and sign the prescription.
Sample Prescription

DEA#: 8543201  John Jones, M.D.  Tel: 544-8976
108 N. Main St.
City, State

Patient  Ms. Jean Smith   DATE  10/7/07

ADDRESS  310 E. 70th St., Anytown, State

Rx:  Lipitor  40 mg tab
Disp:  # 30
Sig:  T hs

Refill  3 Times
Please label  ✔

John Jones, M.D.
Drug Interactions with the Body: Pharmacokinetics

• Study of the movement of drugs throughout the body

• Four actions occur when a drug is taken:
  – Absorption
  – Distribution
  – Metabolism
  – Excretion
Pharmacokinetic Terms

• **Absorption**: How a drug is absorbed into the body's circulating fluids. May have local or systemic effect.

• **Parenteral**—Administration of drugs by injection
  – Administered directly into the bloodstream (IV) or into tissues with rich blood supply
  – Fastest acting route of administration (IV, IM, SC)

• **Topical and mucous membrane absorption**
  – Examples: suppositories, nasal sprays, transdermal patches, inhalants
Pharmacokinetic Terms

- **Distribution**: How a drug is transported from the site of administration.
- **Metabolism**: How the drug is inactivated, including the time it takes for a drug to be detoxified and broken down into byproducts.
- **Excretion**: The route by which a drug is excreted, or eliminated, from the body and the amount of time such a process requires.
Top 50 Prescribed Drugs

• Refer to Table 33-5 for details about the most frequently prescribed medications in the United States.
Classifications of Drug Actions

- Drugs are generally classified according to their actions on the body or according to the body system they affect.
- May have multiple actions and therefore multiple classifications.
Analgesics

• Action: Lessens the sensory function of the brain
• Examples:
  – Nonnarcotic—aspirin; acetaminophen (Tylenol); ibuprofen (Advil, Motrin)
  – Narcotic—oxycodone (OxyContin); meperidine (Demerol); hydrocodone (Vicodin); propoxyphene (Darvon)
• Primary use: Pain relief
**Antacids**

- **Action:** Decreases the acidity in the stomach
- **Examples:** omeprazole (Prilosec); esomeprazole (Nexium); rabeprazole (Aciphex); lansoprazole (Prevacid); pantoprazole (Protonix); magaldrate (Riopan); calcium carbonate (Maalox)
- **Primary use:** Treatment of gastric hyperacidity
Antianxiety

- Action: Reduces anxiety and tension
- Examples: Chlordiazepoxide (Librium); diazepam (Valium); alprazolam (Xanax)
- Primary use: Produces calmness and releases muscle tension
Antibiotics

• Action: Kills or inhibits the growth of microorganisms

• Examples: Cefaclor (Ceclor); levofloxacin (Levaquin); tetracycline (Acromycin); amoxicillin (Augmentin); ciprofloxacin (Cipro)

• Primary use: Treatment of bacterial invasions and infections
Anticoagulants

• Action: Delays or blocks the clotting of blood
• Examples: Heparin; warfarin sodium (Coumadin)
• Primary use: Prevention of blood clots; thrombophlebitis; prevention of clot formation.
Antidepressants

• Action: Treats depression
• Examples: Venlafaxine hydrochloride (Effexor); sertraline (Zoloft); escitalopram (Lexapro); duloxetine (Cymbalta); bupropion (Wellbutrin); trazodone HCl (Desyrel); fluoxetine (Prozac); imipramine pamoate (Tofranil); amitriptyline (Elavil)
• Primary use: Mood elevator
Antihistamines

• Action: Counteracts the effects of histamine; may inhibit gastric secretions
• Examples: Fexofenadine (Allegra); cetirizine (Zyrtec); chlorpheniramine (Chlor-Trimeton); diphenhydramine (Benadryl); promethazine (Phenergan); cimetidine (Tagamet); ranitidine (Zantac).
• Primary use: Relief of allergies; prevention of gastric ulcers
Antihypertensives

• Action: Blocks nerve impulses that constrict arteries; or slows heart rate, decreasing contractility; or restricts the hormone aldosterone in the blood
• Examples: Amlodipine (Norvasc); atenolol (Tenormin); doxa-zosin mesylate (Cardura); metoprolol (Lopressor or Toprol); methyldopa (Aldomet); valsartan (Diovan); amlodipine (Lotrel)
• Primary use: Reduces and controls blood pressure
Antipyretics

• Action: Reduces body temperature
• Examples: Aspirin, acetaminophen, ibuprofen
• Primary use: Reduces fever
Antitussives (Cough Suppressants)

- **Action:** Inhibits the cough center
- **Examples:**
  - Narcotic: Codeine sulfate
  - Nonnarcotic: Dextromethorphan (Romilar, Robitussin DM)
- **Primary use:** Temporarily suppresses a nonproductive cough; reduces the thickness of secretions
Decongestants

• Action: Relieves local congestion in the tissues
• Examples: Ephedrine or phenylephrine (Neo-Synephrine); pseudoephedrine (Sudafed); oxymetazoline (Afrin); mometasone (Nasonex)
• Primary use: Relief of nasal and sinus congestion caused by common cold, hay fever, or upper respiratory tract disorders
Expectorants

• Action: Increases secretions and mucus from the bronchial tubes; allows patient to cough up secretions in lungs
• Examples: Diphenhydramine (Benylin); guaifenesin guaiacolate (Fenesin, Robitussin)
• Primary use: Upper respiratory tract congestion
Bronchodilators

• Action: Relaxes the smooth muscle of the bronchi

• Examples: Aminophylline (Aminophyllin); theophylline (Theo-Dur); epinephrine (Adrenalin, Sus-Phrine); albuterol (Ventolin, Proventil); isoproterenol (Isuprel)

• Primary use: Treatment of asthma, bronchospasm; promotes bronchodilation
Narcotics

• Action: Depresses the central nervous system and causes insensibility or stupor

• Examples:
  – Natural narcotics: Opium group (codeine phosphate, morphine sulfate)
  – Synthetic narcotics: Meperidine (Demerol), methadone (Dolophine), and propoxyphene hydrochloride (Darvon)

• Primary use: Pain relief
Patient Education: Interactions

• Monitor for pregnancy.
• Question drug allergies each office visit.
• Observe patient for 20 minutes after drug administration.
• Educate patient on possible drug side effects.
• Educate patient on dose, time of administration, and drug storage.
• Question patient on whether medication is being taken as ordered.
• Answer questions or consult the physician.
Therapeutic Communications with Patients from Diverse Cultures

• Investigate healing practices of the primary cultures in your area.
• Encourage cultural sensitivity in your co-workers.
• Provide patients with educational materials in their native language.
• Ask patients if they are using home remedies or are consulting a healer from their culture. If so, get as much detail as possible so you can share this information with the physician.