Section I

Pharmacology for Technicians

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Section I includes information related to medication terminology and commonly used medications, herbals, and dietary supplements, such as:

- definitions of commonly used drug and dosage terms
- an explanation of therapeutic equivalence
- commonly used brand and generic drug names, side effects, and interactions
- dosages and indications of frequently used drugs

Chapter 1

Medication Terminology

I. Key Terms and Concepts

A. Pharmacy technicians must understand medication terminology to ensure accuracy in selecting the appropriate drug product and in filling prescriptions and medication orders.

B. *Pharmacology* is the science that deals with the origin, nature, chemistry, effects, and uses of drugs.

C. The terms *trade* and *proprietary* refer to the manufacturer's brand name (protected by trademark) for a particular drug.

D. The terms *generic* and *nonproprietary* refer to a drug name not protected by a trademark, which is usually descriptive of its chemical structure.

E. Compounding is the act or process of combining two or more drug products or chemicals into a single preparation.

F. *Drug interactions* occur when one drug affects or is affected by another substance or condition in the body.

II. Understanding Drug Actions and Uses

A. Pharmacology and drug classifications

1. Technicians should be knowledgeable about drug actions and pharmacological classifications. **Chapter 2** details information about commonly used medications, herbals, and dietary supplements.

III. Strengths, Dosages, and Dosage Forms

A. Drugs are supplied commercially in various strengths and administered in different dosages.

1. The *strength* of a drug is the amount of drug contained in a specified unit.

2. The *dose* or *dosage* of a drug is the quantity of drug taken by a patient. The dose may be expressed as a "daily" dose, "single" dose, or even a "total" dose, which refers to the entire quantity of the drug taken throughout therapy. Daily doses may be given once daily, which is a single dose, or may be divided throughout the day.

    a. The strength is usually specific to the drug and the dosage is specific to the patient. For example, a patient may be prescribed hydrochlorothiazide tablets in a *strength* of 25 mg per tablet and instructed to take a *dosage* of one-half tablet daily (12.5 mg daily).

3. The *dosage form* (e.g., tablet, ointment) usually depends on the route of administration. The dosage form may also affect how quickly or slowly the drug is released into the body. **Table 1-1** lists common dosage forms.

TABLE 1-1. Common Dosage Forms

aerosol	enema	lozenge	solution
capsule	extract	ointment	suppository
cream	gel	paste	suspension
drops	granule	patch	syrup
elixir	injection	pellet or implant	tablet
emulsion	lotion	powder	tincture

4. The *dosage regimen* refers to the schedule of medication administration (e.g., every 4 hours, 3 times a day, at bedtime).

5. When a drug is not commercially available in a specific strength or dosage form, it may need to be compounded specially for a specific patient. **Section IV** includes more details about pharmacy compounding.

IV. Physical Appearance

A. Drugs have distinctive physical appearances, colors, odors, and textures.

1. A change in physical appearance may indicate a drug is expired, contaminated, or should no longer be used.

2. A drug's physical appearance can be verified in the package insert or with a print or online pharmacy reference.

V. Routes of Administration

The *route of administration* is the way the drug gets into the body (e.g., by mouth or injection). **Table 1-2** lists drug administration routes.

TABLE 1-2. Drug Administration Routes

buccal	intranasal	oral	sublingual
epidural	intraperitoneal	otic	topical
inhalation	intrathecal	parenteral	transdermal
intra-arterial	intravenous	perivascular	urethral
intracardiac	nasal	rectal	urogenital
intramuscular	ophthalmic	subcutaneous	vaginal

VI. Therapeutic Equivalence

A. The term *therapeutic equivalence* refers to the process that certifies that a generic drug has the same active ingredients, dosage form, standards for purity and quality, and standards for manufacturing, and that the same amount of drug is absorbed in the body over the same time as with the proprietary (brand name) drug.

B. The U.S. Food and Drug Administration's (FDA) *Orange Book* assigns therapeutic equivalence ratings to generic drugs. For example, "AB-rated" generic drugs are considered to be therapeutically equivalent to their brand counterparts.

VII. Drug Interactions

A. Drug interactions can cause additive or antagonistic effects, or potentiate the effects of one of the interacting drugs.

B. Different types of drug interactions include:

1. *Drug-Drug*: one drug (prescription or nonprescription) affects the action of another drug. For example, some antibiotics increase levels of the blood thinner warfarin by changing how warfarin is metabolized.

2. *Drug-Disease*: a patient's disease affects a drug's action or the drug worsens a patient's disease. For example, patients with uncontrolled high blood pressure should avoid oral pseudoephedrine decongestants because they may increase blood pressure.

3. *Drug-Dietary Supplement*: a dietary supplement interacts with the drug. For example, St. John's wort can decrease levels of some birth control pills.

4. *Drug-Laboratory*: a drug affects a patient's laboratory test, such as drugs that change urine color and affect urinalysis results.

5. *Drug-Nutrient*: a nutrient interacts with a drug or the drug affects nutrient levels, such as drugs that decrease levels of some vitamins.

C. Use caution when you see a drug interaction. Although some are benign, others can have serious effects and cause dangerously high or low drug levels. Pharmacy technicians should alert the pharmacist when a drug interaction is detected.

VIII. Chapter Summary

A. As health care practitioners involved daily with medications, technicians must understand all aspects of medication terminology. Familiarity with medical terms and their practical use can help technicians to accurately interpret drug orders and avoid medication errors.

B. When handling drug products or processing prescriptions and medication orders, technicians must ensure the appropriate medication strength, dosage, dosage form, and route of administration.

C. When substituting a generic medication for a proprietary medication, ensure that it is therapeutically equivalent to the brand name product.

D. Technicians should stay alert for drug interactions to help avoid drug therapy problems.

IX. Questions for Discussion

A. Discuss the difference between a drug's strength and its dosage.

B. Why is it important to examine a drug's physical appearance when filling a prescription?

C. Discuss some examples of non-oral drug administration routes. When might these be used in practice?

D. What factors should you evaluate when determining the therapeutic equivalence of two drugs? What could result if a generic drug is administered that is not equivalent to its proprietary counterpart?

E. Why is it important to look for drug interactions when processing prescription orders? List some examples of potentially harmful drug interactions.

X. Sample Questions

1. A prescription is written for amoxicillin 500 mg, Take 2 capsules (1000 mg) daily. What is the strength of the amoxicillin in this prescription?

   a. 500 mg
   b. 1000 mg
   c. 1500 mg
   d. 2000 mg

2. A drug's brand name is also referred to as which of the following:

   a. nonproprietary name
   b. trade name
   c. marked name
   d. FDA name

3. Which of the following terms describes a dosage form?

   a. suppository
   b. intravenous
   c. lozenge
   d. both a and c

4. Which of the following terms describes a route of administration?

   a. intranasal
   b. proprietary
   c. dosage form
   d. nutrient

5. A brand and generic drug are tested to determine if they have the same active ingredients, dosage form, standards for purity and quality, and standards for manufacturing. This process is called determining:

   a. proprietary natures
   b. drug sameness
   c. therapeutic equivalence
   d. dosage forms

6. A patient takes two drugs that have additive effects causing excessive drowsiness. This is an example of which of the following types of drug interactions:

   a. drug-drug
   b. drug-nutrient
   c. drug-dietary supplement
   d. drug-laboratory

7. While entering a prescription into the computer, you see an alert about a potential interaction between a patient's warfarin and his ginkgo biloba. This is an example of which of the following types of interactions:

   a. drug-drug
   b. drug-nutrient
   c. drug-dietary supplement
   d. drug-laboratory

The **Answer Key** appears in **Section VIII**.

Notes: