Dosage Administration

Dosage Forms and Their Usages

Medications often consist of small quantities of active ingredients combined with inactive ingredients to create various dosage forms. Dosage forms are designed to help patients take their medications by improving taste, appearance, stability, availability, and absorption. Some medications are prepared in more than one dosage form. The pharmacy technician should ensure the dosage dispensed matches the dosage form prescribed.

Dosage Forms

Enteral medications are given orally and pass through the gastrointestinal tract to be absorbed into the bloodstream and metabolized by the liver. This includes oral, nasogastric, and rectal routes.

Parenteral medications are injected or placed into body tissues and do not pass through the liver before entering the bloodstream. They may include injections, topical, and inhalation routes. Generally in pharmacy, parenteral refers to injection. Topical and inhalation routes are separated into their own routes of administration.

Injectable drugs are usually in the form of solutions or powders. The powders are mixed with a sterile diluent to render an injectable solution.

Inhalation routes of administration are inhaled through the mouth or nose and usually act directly on the respiratory system before entering the bloodstream. They are often used to treat respiratory diseases, but gases are inhaled for general anesthesia as well.

Dosage forms include: enteral and parenteral medications, injectable drugs, inhalation and topical medications.

Topical dosages are applied to the skin surface or a mucous membrane.

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Oral Solid Dosage Form

Capsules are cylinder-shaped containers made of gelatin filled with medication.

Tablets vary in shape, color, and weight; they can be formulated to delay absorption, extend the release of the medication, or change other properties of the medication.

Types of tablets include:

- **Buccal**: placed in the buccal pouch (area between the cheeks and the gums)
- **Sublingual**: placed under the tongue to dissolve quickly
- **Chewable**: intended to be chewed before swallowing; tablets will be specifically marked for chewing
- **Effervescent**: dissolve in a glass of water, should not be chewed or swallowed; contain mixtures or acid and sodium bicarbonate plus active ingredients
- **Enteric coated**: coated to prevent dissolutions in the stomach
- **Troches and lozenges**: keep the medication in contact with the mouth; held in the mouth while they dissolve.
- **Pills**: originally made from powdered raw materials such as roots, leaves and animal glands
  - People often refer to capsules and tablets as pills, however, professionals should refer to each dosage form appropriately.

**Oral solid dosage forms include**: capsules and tablets. Professionals should refer to each dosage form appropriately.

Controlled-Release Products

Controlled-release products release medications over an extended period of time to avoid high concentrations of the medication in the digestive tract or to provide longer durations of action. Tablets, capsules, and in some cases, medication particles are coated to release portions of the medication into the body at specific times.
Dosage forms contain 2-4 times the regular dose of medication that is released over 8-24 hours.

Controlled-release products are identified by their manufacturers with the following acronyms:
- LA: long acting
- SA: sustained action
- SR: sustained release
- CR: controlled release
- XR/XL: extended release
- TR: timed release

**Oral Liquid Dosage Forms**

Most oral liquid dosage forms are dissolved in water, alcohol, or another suitable solvent. Most contain sugar and flavoring agents to improve their taste.

- **Solutions**: solid ingredients usually dissolved in water
- **Reconstituting Powders to Liquids**: a specific amount of distilled water is used to convert powders and liquids into solutions or suspensions; deteriorate quickly; effective for 10-14 days; require refrigeration
  - Many liquid antibiotics are reconstituted powders
- **Elixirs**: made of water and alcohol with flavoring substances intended for oral use
- **Fluid extracts and tinctures**: made with water and/or alcohol with plant extracts as the active ingredients
- **Spirits or essences**: made with a high percentage of alcohol
  - Must be stored in an airtight container to prevent evaporation
- **Syrups**: made with sugar, water, and added active ingredients; may also contain alcohol
- **Emulsions**: made with oil and water; oil may settle at the top; must be shaken before dispensing

**Topical Dosage Forms**

Topical treatments are applied on the body. Most topical medications are used to treat the eyes, ears, and skin. These medications can also be applied or inserted as creams or suppositories.
**Ointments**: made with petroleum jelly; for areas of the skin that need protection; leave an oily coating

**Creams**: combination of oil, water, and other substances; less greasy and absorbed into the skin

**Lotions**: applied more easily over a larger area of the body; similar to creams, but contain more liquid

**Liniments**: used for their heat-producing effects; mixtures of various substances in oil alcoholic solutions of soap or emulsions intended for external application.

**Gels**: semi-solid suspensions or very small particles, usually in a water base

**Collodions**: liquids that dry as flexible films on skin; wart and callous removers are prepared as collodions

**Transdermal patches**: designed for prolonged action, delivering constant medication from 12 hours to several days
  - Examples: estrogens for hormone replacement; patches designed for smoking cessation

**Suppositories**: made for insertion into the rectum and vagina; manufactured in cylindrical, egg, or pear shapes; may be designed for a local effect or systemic result

**Vaginal tablets and/or ovules**: inserted into the vagina upon the removal of an outer wrapping such as aluminum foil (e.g., Cleocin Ovules- the term refers to eggs because the tablet is shaped like an egg.)

**Otic and ophthalmic preparations**: ear (otic) medications are usually supplied in droplet bottles
  - Ophthalmic (eye) medications must be sterile and can be supplied as drops or ointments.

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**Other Types of Dosage Forms**

**Aerosols**: spray-able products that use pressurized gas and valve systems to deliver medications; used for topical application to the skin or as an inhalant for the lungs and nasal passages

**Chewing gum**: medications are absorbed through the mucous membranes; common uses are nicotine gum for smoking cessation

**Parenteral medications**: sterile preparations that are injected with syringes
  - Insulin is the most common parenteral medication.

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**Questions**
1. Why are there so many different dosage forms?
2. How are topical medications administered?