

Ishik International University

Nursing Department

Fundamental of Nursing

Medication

Lecturer: Halmat Authman Rasheed

Objectives

- Introduction
- Types of drug preparations
- Actions of drugs on the body
- legal aspects of drug administration
- Factors affecting medication action
- Routes of administration

Introduction

- Medication is a substance administered for the diagnosis, treatment, or relief of a symptom or for prevention of disease.
- **Prescription** is a written direction for the preparation and administration of a drug.

One drug can have four names

- Generic name,
- Trade name (or brand name),
- Official name,
- Chemical name

Generic name: A term referring to any drug marketed under its chemical name without advertising.

Example: Metformin, Doxazosin, Amoxicillin, Cefixime, Azithromycin.



Trade name (sometimes called the brand name) is the name given by the drug manufacturer and identifies it as property of that company.

Example: Glucophage.

Polymox, Trimox, Wymox.

Suprax. Zithromax, Zomax,

Zitron, Zaha.



- **Official name** is the name under which a drug is listed in one of the official publications (e.g., the United States Pharmacopeia).
- **Chemical name** is the name by which a chemist knows it; this name describes the constituents of the drug precisely.

Example

Chemical Name

N-acetyl-p-aminophenol,
methylpropyl)phenyl)propanoic acid

Generic Name

Acetaminophen, ibuprofen

brand Name

Tylenol, Motrin

- **Pharmacology** is the study of the effect of drugs on living organisms.
- **Pharmacy** is the art of preparing, compounding, and dispensing drugs. The word also refers to the place where drugs are prepared and dispensed.

- **Pharmacist** is a specialist who often guides the primary care provider in prescribing drugs.
- The licensed pharmacist prepares, makes, and dispenses drugs as ordered by a physician, dentist, nurse practitioner, or physician assistant.

Drug Standards

- Drugs may have natural (e.g., plant, mineral, and animal) sources, or they may be synthesized in the laboratory.
- For example, digitalis and opium are plant derived, iron and sodium chloride are minerals.
- insulin and vaccines have animal or human sources,

Types of drug preparations

- **Aqueous suspension:** One or more drugs finely divided in a liquid such as water.



- **Caplet:** A solid form, shaped like a capsule, coated and easily swallowed.



- **Capsule:** A gelatinous container to hold a drug in powder, liquid, or oil form



- **Cream:** A non greasy, semisolid preparation used on the skin.
- **Lotion:** A medication in a liquid suspension applied to the skin.



- **Tablet:** A powdered drug compressed into a hard small disk; some are readily broken along a scored line; others are enteric coated to prevent them from dissolving in the stomach



Legal Aspects of Drug Administration

Nurses need to

- know how nursing practice acts in their areas define and limit their functions.
- be able to recognize the limits of their own knowledge and skill.

- Nurses are responsible for their own actions regardless of whether there is a written order.
- If a primary care provider writes an incorrect order (e.g., morphine 100 mg instead of morphine 10 mg),
- A nurse who administers the written incorrect dosage is responsible for the error as well as the primary care provider.

- Therefore, nurses should question any order that appears unreasonable and refuse to give the medication until the order is clarified.
- Another aspect of nursing practice governed by law is the use of controlled substances.

- The information required usually includes the name of the client, the date and time of administration, the name of the drug, the dosage, and the signature of the person who prepared and gave the drug.
- The name of the primary care provider who ordered the drug may also be part of the record.

- Some agencies may require a verifying signature of another registered nurse for administration of a controlled substance.
- When a portion or all of a controlled substance dose is discarded, the nurse must ask a second nurse to witness the discarding. Both nurses must sign the control inventory form.

Effects of Drugs

- **The therapeutic effect** of a drug, also referred to as the desired effect, is the primary effect intended, that is, the reason the drug is prescribed. For example, the therapeutic effect of morphine sulfate is analgesia, and the therapeutic effect of diazepam is relief of anxiety

- **Side effects** are usually predictable and may be either harmless or potentially harmful. For example, digitalis increases the strength of myocardial contractions (desired effect), but it can have the side effect of inducing nausea and vomiting. more severe side effects, also called adverse effects

- **Drug toxicity** (harmful effects of a drug on an organism or tissue) results from over dosage, ingestion of a drug intended for external use, or buildup of the drug in the blood because of impaired metabolism or excretion.
- **An example** of a toxic effect is respiratory depression due to the cumulative effect of morphine sulfate in the body.

- **Drug allergy** is an immunologic reaction to a drug.
- **Allergic reactions** can be either mild or severe. A mild reaction has a variety of symptoms, such as skin rash, pruritus, angioedema, rhinitis, lacrimal tearing, nausea, vomiting, wheezing and dyspnea, diarrhea.

Skin rash



Angioedema





Therapeutic Actions of Drugs

- **Palliative:** Relieves the symptoms of a disease but does not affect the disease itself.

Example: Morphine sulfate, aspirin for pain.

- **Curative:** Cures a disease or condition.

Example: Penicillin for infection

- **Supportive:** Supports body function until other treatments or the body's response can take over.

Example: aspirin for high body temperature.

- **Substitutive:** Replaces body fluids or substances.

Example: insulin for diabetes mellitus.

- **Chemotherapeutic:** Destroys malignant cells.

Example: Busulfan for leukemia.

- **Restorative:** Returns the body to health.

Example: Vitamin, mineral supplements

- A severe allergic reaction usually occurs immediately after the administration of the drug and is called an **anaphylactic reaction** .
- This response can be fatal if the symptoms are not noticed immediately and treatment is not obtained promptly.
- The earliest symptoms are a subjective feeling of swelling in the mouth and tongue, acute shortness of breath, acute hypotension, and tachycardia

- **A cumulative effect** is the increasing response to repeated doses of a drug that occurs when the rate of administration exceeds the rate of metabolism or excretion.
- As a result, the amount of the drug builds up in the client's body unless the dosage is adjusted. Toxic symptoms may occur.

Drug Misuse

- Drug abuse
- Drug dependence
- Illicit drugs, also called street drugs

Actions of drugs on the body

- **Pharmacodynamics** is the mechanism of drug action and the relationships between drug concentration and responses in the body
- **Pharmacokinetics** is the study of the absorption, distribution, biotransformation, and excretion of drugs.

- **Absorption** is the process by which a drug passes into the bloodstream.
- Unless the drug is administered directly into the bloodstream, absorption is the first step in the movement of the drug through the body.
- **Distribution** is the transportation of a drug from its site of absorption to its site of action.

- **Biotransformation**, also called detoxification or metabolism, is a process by which a drug is converted to a less active form. Most biotransformation takes place in the liver,
- **Excretion** is the process by which metabolites and drugs are eliminated from the body.
- Most drug metabolites are eliminated by the kidneys in the urine; however, some are excreted in the feces, the breath, perspiration, saliva, and breast milk.

Routes of administration

Oral

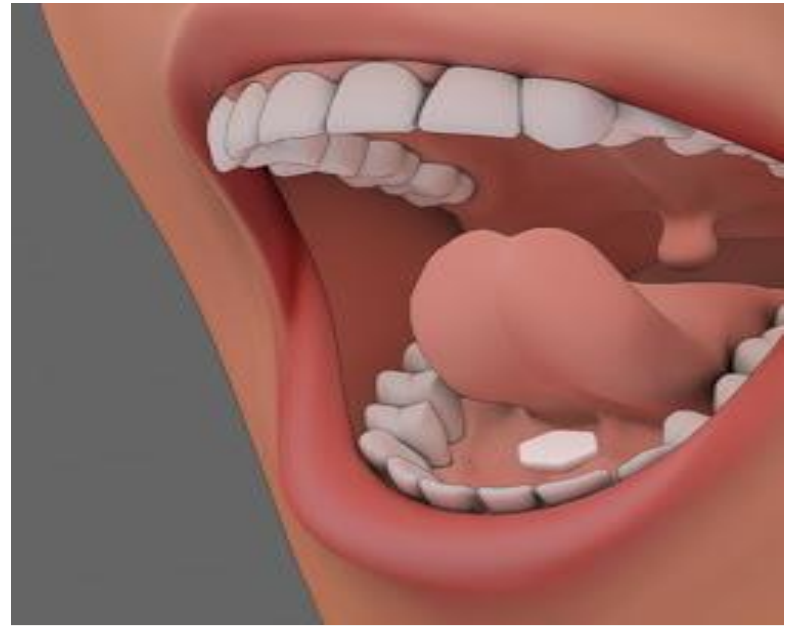
Sublingual

Buccal

Rectal

Vaginal

Topical



Transdermal

Subcutaneous

Intramuscular

Intradermal

Intravenous

Inhalation



Medication orders

- A physician usually determines the client's medication needs and orders medications, although in some settings nurse practitioners and physician assistants now order some drugs.

Essential parts of a drug order

- Full name of the client
- Date and time the order is written
- Name of the drug to be administered
- Dosage of the drug
- Frequency of administration
- Route of administration
- Signature of the person writing the order

Basic units of drug measurement

- The measurements of volume (the liter) and of weight (the gram). These are the measures used in medication administration.

Basic units of drug measurement

Cont.

- The kilogram (kg) is the only multiple of the gram used, and the milligram (mg) and microgram (mcg) are subdivisions.
- Fractional parts of the liter are usually expressed in milliliters (mL). for example, 2.5 liters or 2,500 mL

Change milligrams to grams

- the nurse divides the number of milligrams by 1,000. The simplest way to divide by 1,000 is to move the decimal point three places to the left:

- $500 \text{ mg} = ? \text{ g}$

Move the decimal point three places to the left:

- Answer = 0.5 g

Convert grams to milligrams

Multiply the number of grams by 1,000, or move the decimal point three places to the right:

$$0.006 \text{ g} = ? \text{ mg}$$

Move the decimal point three places to the right:

$$\text{Answer} = 6 \text{ mg}$$

Methods of Calculating Dosages

- D = desired dose (i.e., dose ordered by primary care provider)
- H = dose on hand (i.e., dose on label of bottle, vial, ampule)
- V = vehicle (i.e., form in which the drug comes, such as tablet or liquid).
- Formula = $\frac{D * V}{H}$ = amount to administer

- **Example**
- Order: Erythromycin 500 mg
- On hand: 250 mg in 5 mL

Medication administration errors

- The National Coordinating Council for Medication Error Reporting and Prevention (NCC MERP) (2013) estimates that 98,000 people die annually from medical errors that occur in hospitals and that a significant number of those deaths are due to medication errors.

Definition of medication error

“any preventable event that may cause or lead to inappropriate medication use or patient harm while the medication is in the control of the health care professional, patient, or consumer. Such events may be related to professional practice, health care products, systems, including prescribing; order communication;

Medication error

Cont.

Medication errors can occur at all stages of the medication administration process.

Tzeng, Yin, and Schneider 2013, p. 14) describe the four main types of medication errors that occur with hospitalized clients:

- (1) prescription errors (e.g., wrong drug or dose).

Medication error

Cont.

(2) transcription/ interpretation error (e.g., misinterpretation of abbreviations).

(3) preparation errors (e.g., calculation error).

(4) administration errors (e.g., wrong dose, wrong time, omission, or additional dose).

Most medication errors occur during the administration stage.

Medication error

Cont.

- Medication administration errors result from system and individual factors.
- Individual factors include fatigue and stress.
- Systemic factors include interruptions and distractions during medication administration.
- Interruptions and distractions hinder the ability of the nurse to stay focused on the task

Medication error

Cont.

- sources of interruption during medication administration. Sources include monitor alarms, telephone calls, and family inquiries, with the most common source being questions from nursing colleagues and other health care team members.

Ten “Rights” of Medication Administration

- Right medication
- Right dose
- Right time
- Right route
- Right client

Ten “rights” of medication administration

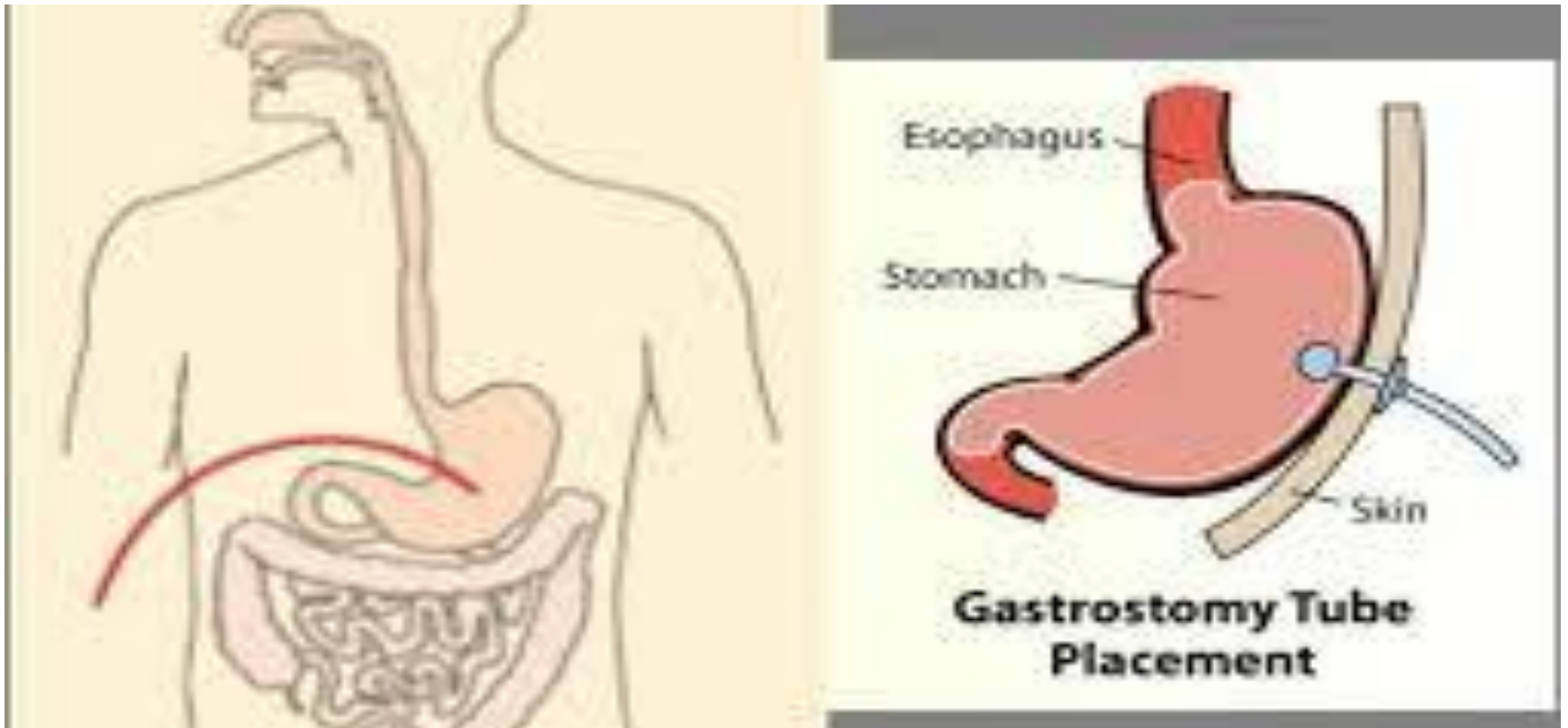
Cont.

- Right client education
- Right documentation
- Right to refuse
- Right assessment
- Right evaluation

Nasogastric and Gastrostomy medications

- For clients who cannot take anything by mouth (NPO) and have a nasogastric tube or a gastrostomy tube in place, an alternative route for administering medications is through the nasogastric or gastrostomy tube.

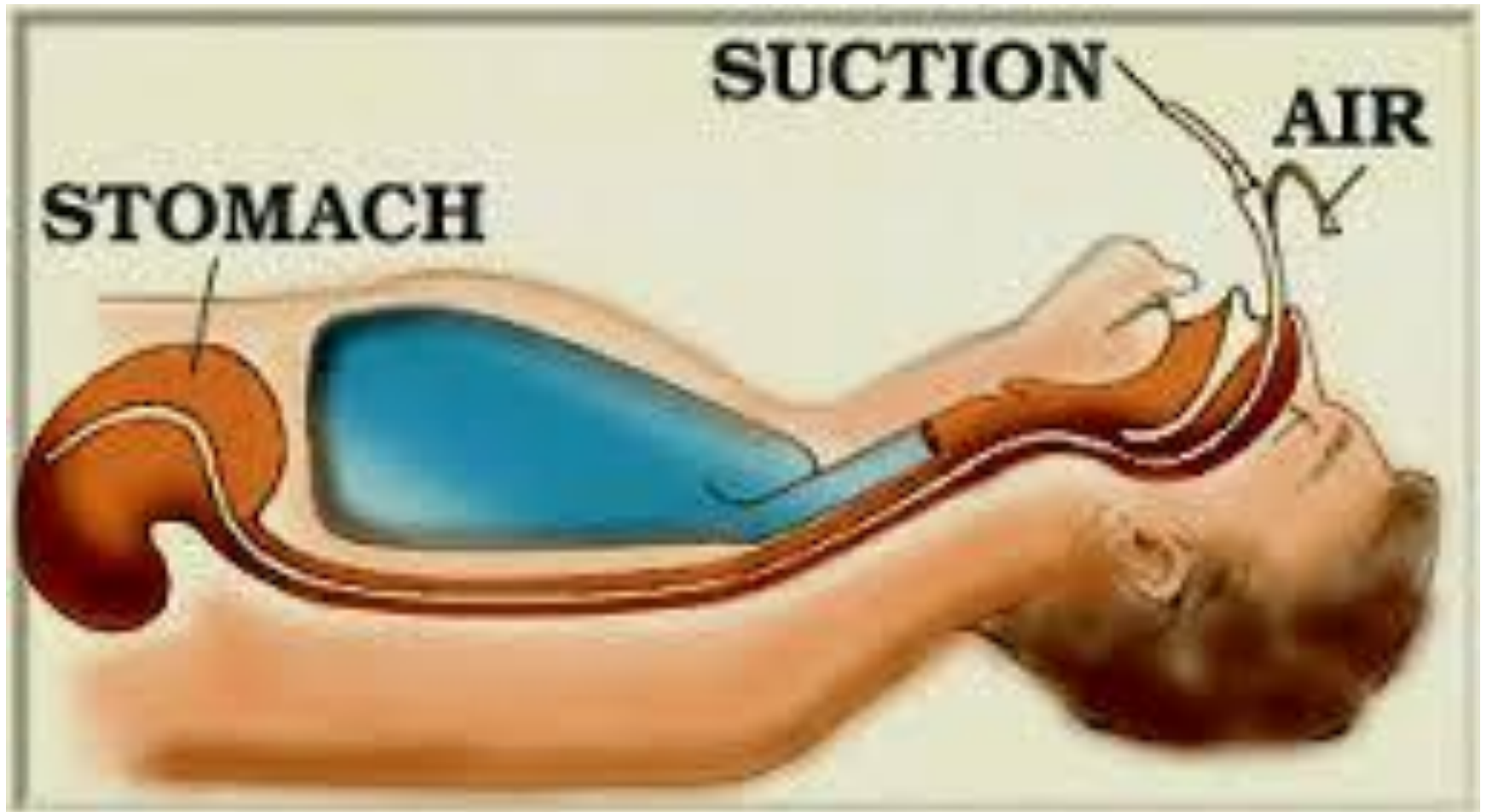
Gastrostomy



Nasogastric tube (NG tube)



Nasogastric tube (NG tube)



Parenteral medications

Parenteral administration of medications is a common nursing procedure. Nurses give parenteral medications intradermally (ID), subcutaneously, intramuscularly (IM), or intravenously (IV). Because these medications are absorbed more quickly than oral medications and are irretrievable once injected.

Parenteral medications

Cont.

- nurse must prepare and administer them carefully and accurately. because injections are invasive procedures, aseptic technique must be used to minimize the risk of infection.

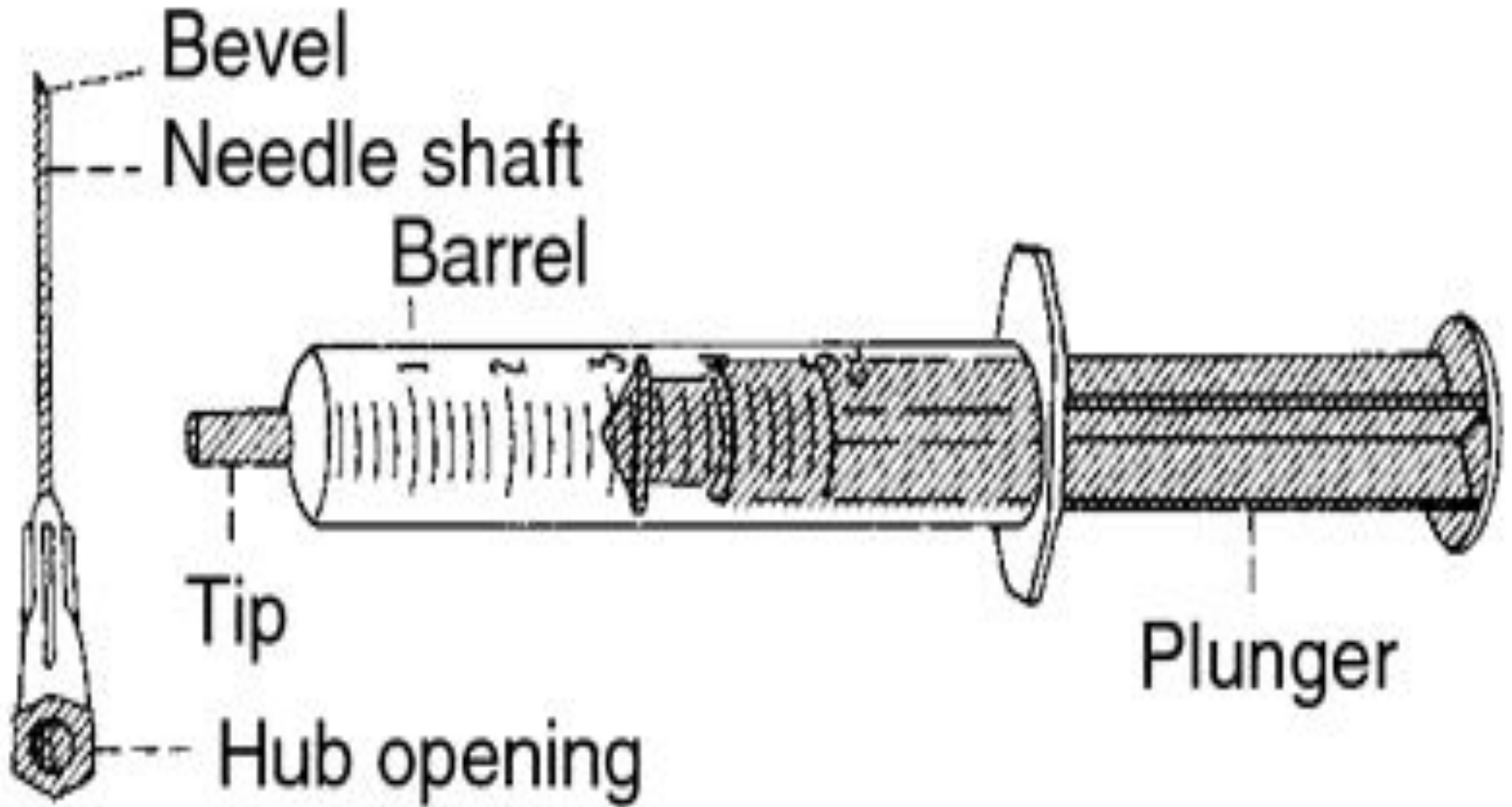
Equipment

- To administer parenteral medications, nurses use syringes and needles to withdraw medication from ampules and vials.
- Syringes have three parts: the tip, which connects with the needle; the barrel, or outside part, and the plunger, which fits inside the barrel.

A needle

has three discernible parts: the hub , which fits onto the syringe; the cannula , or shaft , which is attached to the hub; and the bevel, which is the slanted part at the tip of the needle.

Syringes have three parts



- A hypodermic syringe comes in 3- and 5-mL sizes. The choice of syringe depends on many factors, such as medication, location of injection, and type of tissue.
- The larger sized syringes (e.g., 10, 20, and 50 mL) are not used to administer drugs directly but can be useful for adding medications to IV solutions or for irrigating wounds.

3 mL syringe



5 mL syringe

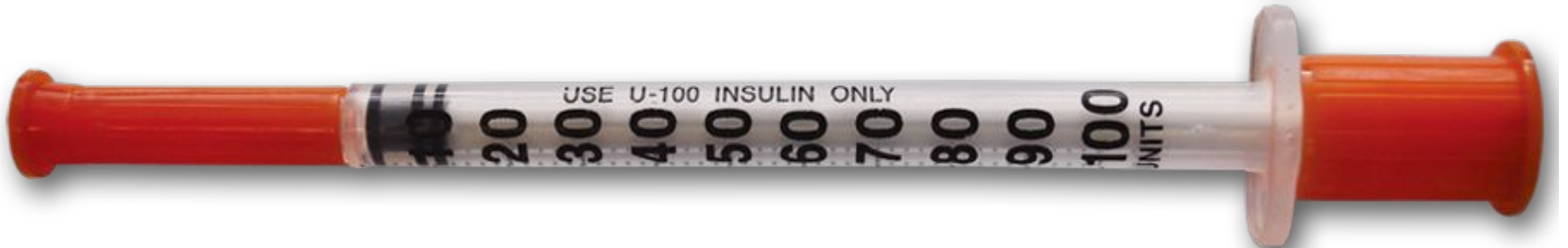


Insulin syringe

Is similar to a hypodermic syringe, but the scale is specially designed for insulin: a 100-unit calibrated scale intended for use with U-100 insulin. This is the only syringe that should be used to administer insulin. Several low-dose insulin syringes are also available (e.g., 30-unit and 50-unit).

The correct choice of syringe is based on the amount of insulin required.

Insulin syringe



Avoiding puncture injuries

Use appropriate puncture-proof disposal containers to dispose of uncapped needles and sharps. These are provided in all client areas. Sharps include any items that can cut or puncture skin such as:

- Needles
- Surgical blades
- Lancets
- Razors
- Broken glass

Sharps container.



Recapping a needle using the one-handed scoop

(a) placing the needle cap and syringe with needle horizontally on a flat surface, (b) inserting the needle into the cap, using one hand. and then (c) using your other hand to pick up the cap and tighten it to the needle hub.

One-handed scoop method



Ampules and vials

- An ampule is a glass container usually designed to hold a single dose of a drug. It is made of clear glass and has a distinctive shape with a constricted neck.
- Ampules vary in size from 1 to 10 mL or more. Most ampule necks have colored marks around them, indicating where they are prescored for easy opening.



A vial is a small glass bottle with a sealed rubber cap. Vials come in different sizes, from single-use vials to multiple-dose vials. They usually have a metal or plastic cap that protects the rubber seal and must be removed to access the medication.

A single-use vial contains only one dose of medication and should only be used once. In contrast, a multi dose vial is a bottle of liquid medication that contains more than one dose, such as insulin or vaccination vials.



Intradermal injections

An intradermal (ID) injection is the administration of a drug into the dermal layer of the skin just beneath the epidermis. Usually only a small amount of liquid is used, for example, 0.1 mL. This method of administration is frequently used for allergy testing and tuberculosis(TB) screening.

Common sites for intradermal injections are the inner lower arm, the back beneath the scapulae, and the upper chest.