

pharmaceutics

# INTRODUCTION

PRESENTED BY

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- is the science and practice of **discovering, producing, preparing, dispensing, reviewing and monitoring medications**, aiming to ensure the **safe, effective, and affordable use of medicines**. It is a miscellaneous science as it links **health sciences** with **pharmaceutical sciences** and **natural sciences**. The professional practice is becoming more clinically oriented as most of the drugs are now manufactured by pharmaceutical industries. Based on the setting, pharmacy practice is either classified as **community** or **institutional pharmacy**.

# PHARMACY SERVICES

## Functions of Pharmacy Services



## PHARMACY SERVICES

01

Provisioning, purchasing, storing, and distributing drugs, medicinal preparations, pharmaceutical and chemical sundry items.

02

Ensuring potency and quality of drugs during their storage in the hospital.

03

Dispensing prescriptions to in-patients & out-patients.

04

Maintaining information regarding quality, cost, and sources of supply of all drugs.

05

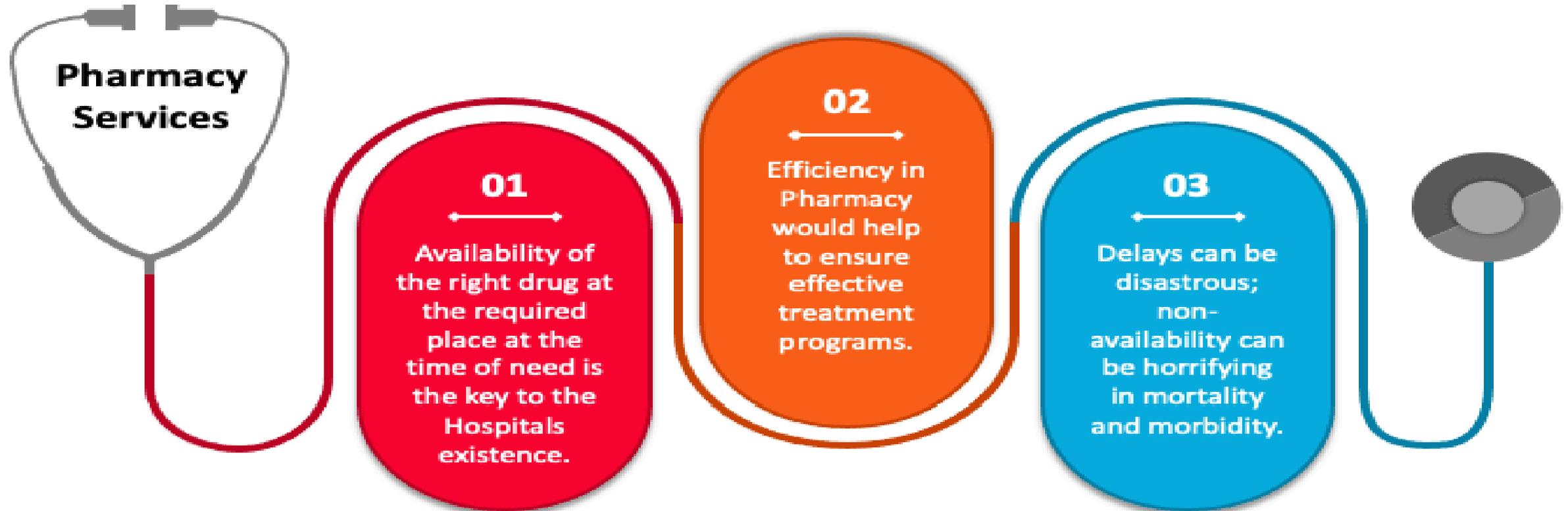
To investigate pharmaceutical problems arising in the medications.

06

To keep a watch on the adherence by all concerned to hospital formulary.

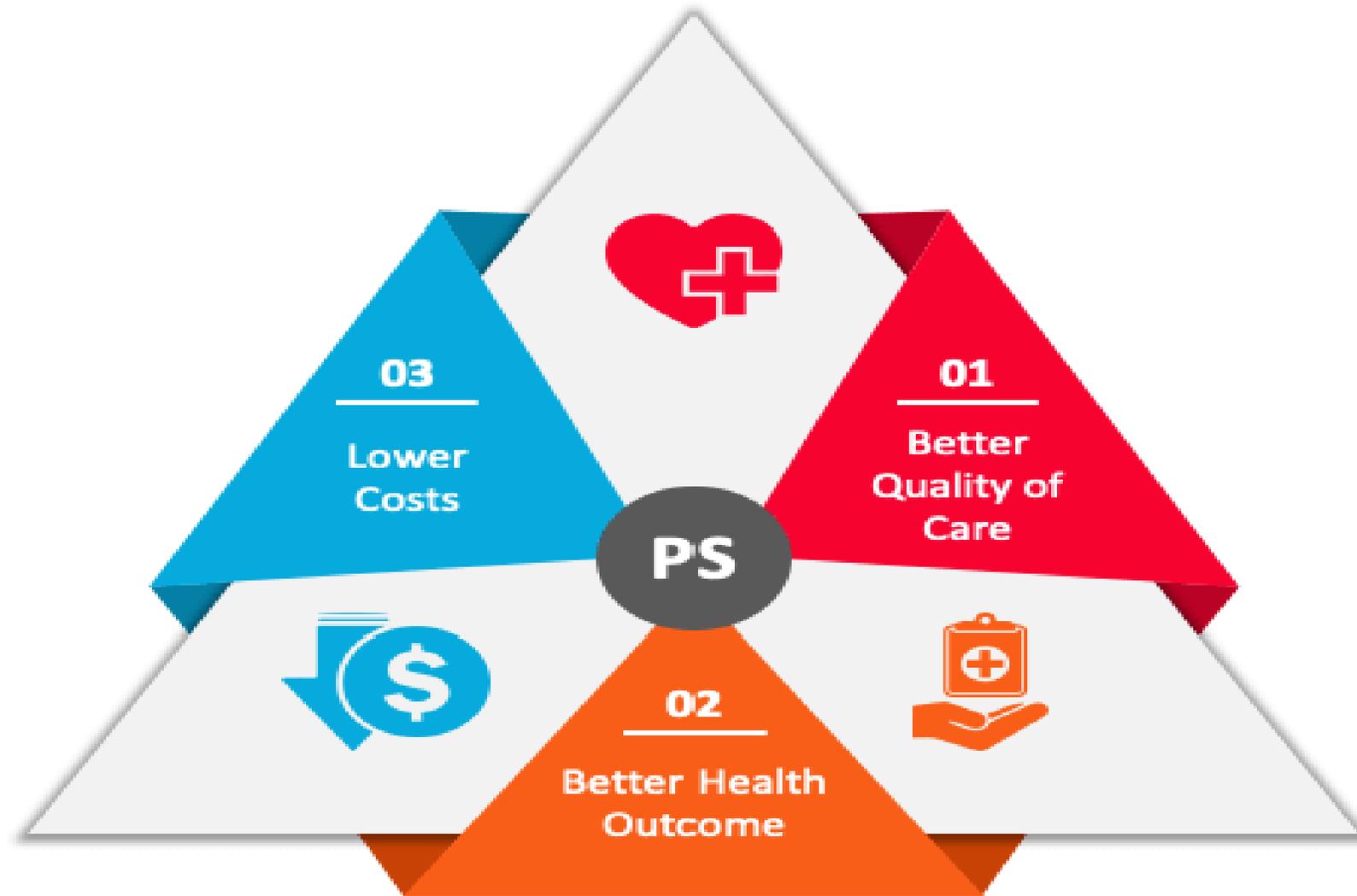
# PHARMACY SERVICES

## Necessity of Pharmacy Services



# PHARMACY SERVICES

Pharmacy Services Aim to Achieve the 'Triple Aim'



# Pharmacists

- **Pharmacists** are healthcare professionals with **specialized education and training** who perform various roles to ensure optimal health outcomes for their patients through the quality use of medicines. Pharmacists may also be small business proprietors, owning the pharmacy in which they practice. **Since** pharmacists know about the mode of action of a particular drug, and its metabolism and physiological effects on the human body in great detail, **they play an important role in optimization of drug treatment for an individual.**

# Pharmacy technicians

- **Pharmacy technicians** support the work of pharmacists and other health professionals by performing a variety of pharmacy-related functions, including **dispensing prescription drugs and other medical devices to patients and instructing on their use**. They may also perform administrative duties in pharmaceutical practice, such as reviewing prescription requests with medic's offices and insurance companies to ensure correct medications are provided and payment is received.
- Legislation requires the supervision of certain pharmacy technician's activities by a pharmacist. **The majority of pharmacy technicians work in community pharmacies**. In **hospital pharmacies**, pharmacy technicians may be managed by other senior pharmacy technicians.

# pharmaceutics

- **Pharmaceutics** is the discipline of pharmacy that deals with the process of turning a new chemical entity (NCE) or old drugs into a medication to be used safely and effectively by patients. It is also called the science of dosage form design.

# pharmaceutics

- **Pharmaceutics** is the overall process of developing a new chemical entity into an approved therapy that is safe and effective in treating or preventing disease. It is a complex process requiring multiple scientific, medical, legal, commercial, and regulatory expertise.

# Pharmacopoeia

- A book describing **drugs, chemicals, and medicinal preparations**.  
especially : one issued by an officially recognized authority and  
serving as a standard.

# The British Pharmacopoeia (BP)

- is the national pharmacopoeia of the **United Kingdom**. It is an annually published collection of quality standards for medicinal substances in the UK, which is used by individuals and organizations involved in **pharmaceutical research, development, manufacture and testing**.

# The United States Pharmacopeia (USP)

- is a pharmacopeia for the United States published annually by the United States Pharmacopeial Convention, Drugs subject to USP standards include both **human drugs** (prescription, over-the-counter, or otherwise) and **animal drugs**.
- **USP-NF** standards also have a role in US federal law.
- **USP** also sets standards for **dietary supplements and food ingredients**



- This is an abbreviation for the word prescription. It is from the Latin word recipe which actually means “take thus.” So, an Rx, or prescription, is just a physician’s direction to “take thus” with instructions on medications to take as well as how to take them and how often.

- The word "prescription", derived from "pre-" ("before") and "script" ("writing, written"), or in literal terms it means, "to write before" a drug can be prepared. thus a medical prescription is an order usually in written form by a qualified health care professional or other therapist for the treatment to be provided to their patient.
- What is unique for each prescription is the name of the patient, date, the details of the medication and the directions for taking them. The prescription should be appropriately signed by the physician prescribing it.
- Prescriptions are typically handwritten on preprinted prescription forms, or may alternatively be using computer these days. The prescription should contain the name and address of the prescribing doctor and any other legal requirement such as registration number of the physician.

# HOW TO WRITE A PRESCRIPTION

## in 6 Easy Steps



### PATIENT & PHYSICIAN INFO

Physician's Info: Name, Office Address, Telephone Number

Patient's info: Name, Age, and Date of Birth

### MEDICATION (RX)

Name of medication, dose, and form (tablets, liquid, etc)

### INSTRUCTIONS (SIG)

Amount to be taken, route of administration, frequency of dose

### DISPENSING

Quantity and form to be dispensed

### REFILLS

Number of Refills permitted

### SIGNATURE

Physician's signature, & ID number. Include NPI for all prescriptions & DEA number for controlled substances.



**Rx**

John Smith, M.D.  
123 Main Street  
Chicago, IL 60606  
Tel: (312) 555-1212  
Fax: (312) 555-1213

Patient Name: Irma Juror  
Age / DOB: 54, 2/28/1968  
Address: 33 S Willow St, Oak Park, IL 60302

Date: 09/13/2022

Rx: Metformin 500mg tablet  
Sig: 1 tablet PO qd with evening meal  
Disp: 30 tabs  
Rf: 2

Prescriber Signature: *John Smith MD*

NPI: 1234567890 DEA: XYZ000123

# Terminology / abbreviations

In the pharmacy world, these are called “sig codes” and provide quick and common prescription instructions

It’s important to know what pharmacy technician medical terminology means because patients’ lives depend on it.

knowing the difference between the code for “take at night” and “take every other day” could be a big part of your job.

**LATIN-BASED ABBREVIATIONS**

a	before
ac	before meals
ad	right ear
as	left ear
au	both ears or each ear
bid	two times a day
c	with
dtd	dispense such doses
gtt, gtts	drop or drops
h, hr	hour
hs	at bedtime (at the hour of sleep)
non rep	do not repeat, no refills
p	after
po	by mouth
prn	as needed
q	every
qd	every day
q am	every morning
q pm	every evening
q hs	every bedtime
qod	every other day (every second day)

q 4 h	every 4 hours (or 3, 6, 8, 12, 24, or other intervals)
qid	four times a day
tid	three times a day
os	left eye
od	right eye
ou	both eyes or each eye
ut dict, ud	as directed
stat	at once, now

**OTHER COMMON ABBREVIATIONS**

APAP	acetaminophen
ASA	aspirin
DAW	dispense as written
IM	intramuscular
IV	intravenous
MOM	milk of magnesia
NSAID	nonsteroidal anti-inflammatory drug
OTC	over-the-counter (as in nonprescription)
PCN	penicillin
SC	subcutaneous
TCN	tetracycline



## Pharmacological Abbreviations



Abbreviation	Latin	Medical English
p.o	<i>per os</i>	By mouth
p.r	<i>pro recto</i>	Rectally
p.v	<i>pro vagin</i>	Vaginal
Stat.	<i>statim</i>	Immediately
p.r.n	<i>pro re nata</i>	As required
b.i.d/b.d	<i>bis in die</i>	Twice daily
t.i.d/t.d.s	<i>ter in die</i>	Three times a day
q.i.d/q.d.s	<i>quater in die</i>	Four times a day
Mane	<i>mane primo</i>	In the morning
Noct.	<i>nocte</i>	At night
Nebul	<i>nebula</i>	Nebulised solution

## Master List of Prescription Abbreviations

Abbreviation	From the Latin	Meaning
aa	ana	of each
ad	ad	up to
a.c.	ante cibum	before meals
a.d.	auris dextra	right ear
ad lib.	ad libitum	use as much as one desires; freely
admov.	admove	apply
agit	agita	stir/shake
alt. h.	alternis horis	every other hour
a.m.	ante meridiem	morning, before noon
amp		ampule
amt		amount
aq	aqua	water
a.l., a.s.	auris laeva, auris sinister	left ear
A.T.C.		around the clock
a.u.	auris utrae	both ears
bis	bis	twice
b.i.d.	bis in die	twice daily
B.M.		bowel movement
bol.	bolus	as a large single dose (usually intravenously)
B.S.		blood sugar
B.S.A		body surface areas
cap., caps.	capsula	capsule
c	cum	with (usually written with a bar on top of the "c")
c	cibus	food
cc	cum cibus	with food. (but also cubic centimetre)
cf		with food
comp.		compound
cr., crm		cream
DSW		dextrose 5% solution (sometimes written as D <sub>5</sub> W)
DSNS		dextrose 5% in normal saline (0.9%)
D.A.W.		dispense as written
dc, D/C, disc		discontinue
dieb. alt.	diebus alternis	every other day
dil.		dilute

# What are Roman numerals?

- Roman numerals are the symbols used in a system of numerical notation based on the ancient Roman system. The symbols are
- I, V, X, L, C, D, and M, standing respectively for 1, 5, 10, 50, 100, 500, and 1,000.

- when one Roman numeral is used after another, the total of both is taken:
- I = 1, II = 2, III = 3
- **No more** than 3 of the same letter is used in succession. For example, we cannot have **IIII**. Instead, it would be **IV**
- When you place a **smaller Roman numeral before a larger Roman numeral**, we must **subtract** the smaller value from the higher value:
- **IX** = 1 taken from 10 = 9
- **IV** = 1 taken from 5 = 4
- **CD** = 100 taken from 500 = 400

- When you place a **smaller Roman after a larger Roman numeral**, you **add** the smaller numeral to the larger numeral:
- XI = 1 to be added to 10 = 11
- VII = 2 to be added to 5 = 7
- MD = 500 to be added to 1,000 = 1,500

- Finally, when a **smaller Roman numeral is sandwiched between two larger Roman numeral values**, we **first** do the **subtraction** step, before finally doing the **addition** step:
- $XIX = X + (1 \text{ taken from } 10) = X + 9 = 10 + 9 = 19$
- $XXIV = XX + (1 \text{ taken from } 5) = 10 + 10 + 4 = 24$

# Instruments-----mortar

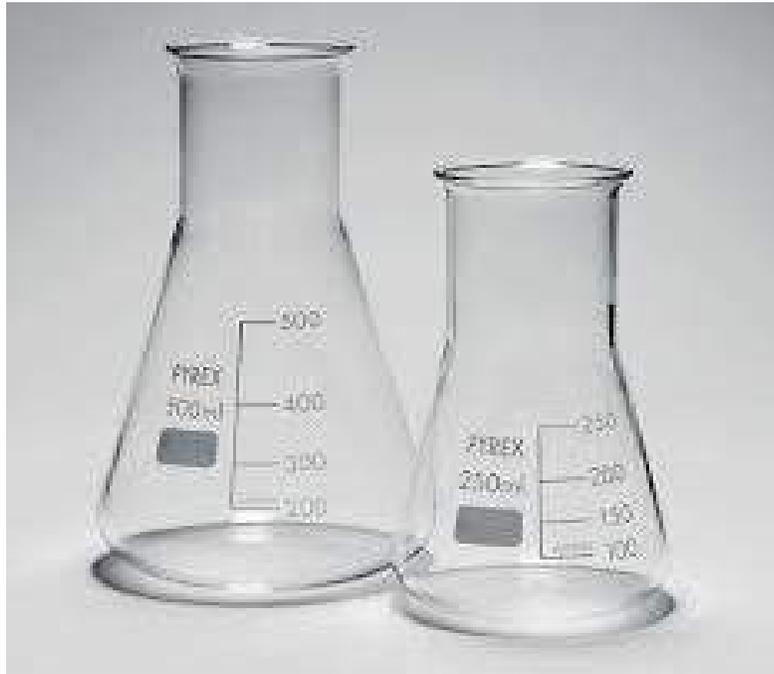


# Graduated cylinder

- Beaker



- Conical flask



- Volumetric flask



- Test tube



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- Washing bottle



100ml

250ml

500ml

1L

- Bulb pipette



- Graduated pipette



- Burette



- Burette



- Test tube brush



- Thermometer



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- Test tube rack



- Funnel



# Reagent bottle



# Home work

**1. Mention briefly the function of each instrument---**

**2. Translate the following abbreviations**

➤ Take omeprazole 40mg cap. A.c. p.o once daily.

➤ Dissolve ceftriaxone vial 1gm in 50cc D5W and give I.V. B.I.D

**3. WHAT are the numbers of the following roman numeral**

CXXIX

LXXXVIII



# Powders

definition ,powders in packets  
,bulked powders, method of  
preparation of compound powders  
,powder in small doses

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# Definition

**A powder is defined as a dosage form composed of a **solid** or **mixture of solids** reduced to a finely divided state and intended for **internal or external use**.**

**powders have a uniform, small particle size that has an elegant appearance.**

**In general, powders are **more stable** than are liquid dosage forms and are **rapidly soluble**, enabling the drug to be absorbed quickly**

# Types of powders

❖ **Medicated Powders divided** into:-

1-bulk powders

2- divided powders

❖ **Topical powders in packet**



# Medicated Powders

Some medicated powders are intended to be used **internally** and others, **externally**.

Most powders for **internal use are taken orally** after mixing with water or in the case of **infants** in their infant formulas.

Some powders are intended to be **inhaled** for local and systemic effects.

others for use as an **injection**.

# Medicated powders

**Powders taken orally for systemic use may be expected to result in **faster rates** of dissolution and absorption **than solid** dosage forms, because there is immediate contact with the gastric fluids.**

**A primary **disadvantage** of the use of oral powders is **the undesirable taste of the drug.****

# Medicated powders

## **Antibiotics**

**for children, are intended for oral administration as liquids but are relatively unstable in liquid form. They are provided as dry powder or granule for constitution with a specified quantity of purified water at the time of dispensing.**

**Sterile dry powders** intended to be constituted with **sterile water of injection** prior to administration by injection.

# Medicated powders

**Some medicated powders are administered by **inhalation** with the aid of dry powder inhalers (DPIs), which deliver micronized particles of medication in metered quantities.**

**Most of these products are used in the treatment of **asthma and other bronchial disorders** that require distribution of medication deep in the lungs.**

# Bulk Powders

**These are limited to those powders which are **non-toxic** and can be measured safely in a spoon by the patient as well as for the dusting powders.**

**Dispensing powder medication in bulk quantities is limited to **non potent substances**.**

# **the bulk powders available are:**

- a) **Antacids** (e.g., sodium bicarbonate) and laxatives (e.g., Metamucil) which the patient takes by mixing with water or another beverages before swallowing.
- b) Medicated powders for external application to the skin, usually topical **anti-infectives** (e.g., bacitracin zinc and polymyxin B sulfate) or antifungals (e.g., tolnaftate).
- c) **Multivitamins and nutritional** supplements powders.

# Divided Powders

**After a powder has been properly blended it may be divided into individual dosing units based on the amount to **be taken or used at a single time.****

**Each divided portion of powder may be placed on a small piece of Paper.**

## Several kinds of papers may be used:

- a) **Simple** bond paper.
- b) **Vegetable parchment**, a thin, semiopaque paper with limited moisture resistance.
- c) **Glassine**, a glazed, transparent paper, also with limited moisture Resistance.
- d) **Waxed paper**, a transparent waterproof paper



**The selection of the type of paper is based primarily on the nature of the powder.**

**If the powder contains **hygroscopic materials**, **volatile components** , **waterproof or waxed paper** should be **used**.**

**Powders containing **neither** volatile components **nor** ingredients adversely affected by air or moisture are usually wrapped in a **white bond paper**.**

# Topical Powders (powder in packet)

Topical powders should have a uniform, small particle size **that will not irritate the skin** when applied. should easily adhere to the skin,

**Talc**, or any other naturally derived product that is to be used on open wounds, should first **be sterilized** to avoid an infection in the area.



# **Method of preparation of powder**

**On a small scale, we can reduce the size of chemical substances by grinding with a mortar and pestle.**

**Grinding a drug in a mortar to reduce its particle size is termed **trituration** or **commination**.**

# **Method of preparation of powder**

**When two or more powdered substances are to be combined to form a uniform mixture, it is best to reduce the particle size of each powder **individually** before weighing and blending.**

# Method of preparation of powder

- **spatulation**
- **Trituration**
- **Sifting**
- **tumbling**

# Spatulation

➤ **Spatulation** is blending small amounts of powders by movement of a spatula through them on a sheet of paper or on ointment slab. It is **not suitable** for large quantities of powders or for powders containing **potent substances**, because homogeneous blending is not as certain as other methods.



**Examples of substances that can be blended by this method are camphor, menthol, phenol, thymol, aspirin,**

# Trituration

## ➤ Trituration

**When a small amount of a potent substance is to be mixed with a large amount of diluent, the geometric dilution method is used to ensure the uniform distribution of the potent drug.(mortar and pestle)**



# Sifting

## ➤ Sifting

**by passing the powders through sifters like those used in the kitchen to sift flour.**

**Sifting results in a light, fluffy product.**

**This process is **not** acceptable for the incorporation of potent drugs into a diluent powder.**



# Tumbling

## ➤ Tumbling

**mixing powders in a rotating chamber.**

**. Mixing by this process is thorough but time consuming.**

**Such blenders are widely employed in industry, as are mixers that use motorized blades to blend powders in a large vessel.**

# ***Tumbling***

**The powder enclosed in a large container which rotates generally by a motorized process.**

**Such blenders are widely employed in industry to blend large amounts of powder.**



# KINDS OF WATER USED IN PHARMACY AND METHOD OF PREPRATION

LECT.2

Sp.ph. ALA`A KOSAY

- **Water** is the most widely used substance, raw material or starting material in the **production, processing and formulation** of pharmaceutical products.
- It has unique chemical properties due to its **polarity and hydrogen bonds**. This means it is able to **dissolve, absorb, adsorb or suspend** many different compounds

## Properties of water USP

- **Water** is clear, colorless and practically tasteless .
- odorless, even near the boiling point.
- Its pH is neutral or just slightly alkaline

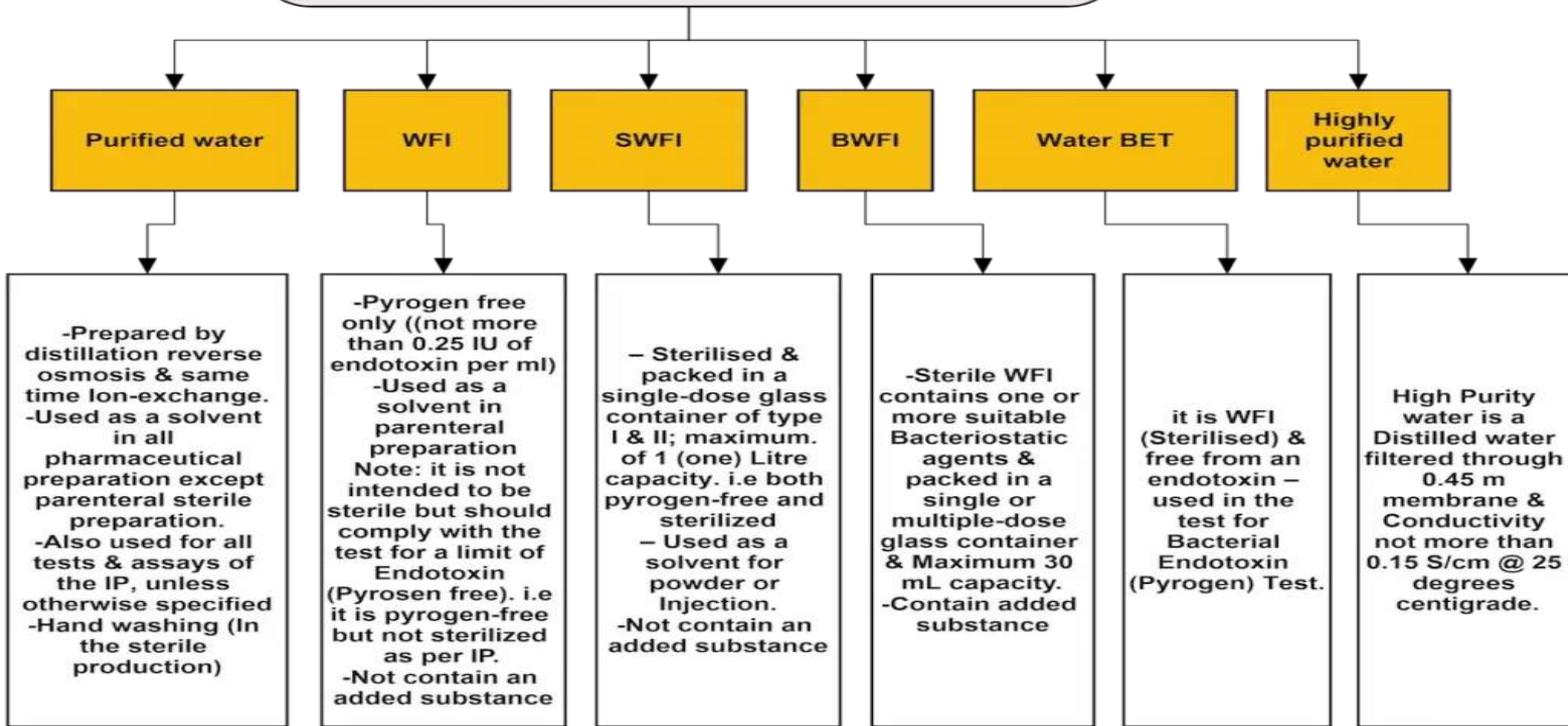
## THE 8 TYPES OF WATER ARE:

- **Non-potable**
- **Potable (drinkable) water**
- **USP purified water**
- **USP water for injection (WFI)**
- **USP sterile water for injection**
- **LUSP sterile water for inhalation**
- **USP bacteriostatic water for injection**
- **USP sterile water for irrigation**

# Tap water or drinking water Uses

- 1. Washing and the extraction of crude drug**
- 2. In the preparation of products for external use**
- 3. In other preparations in which the difference between water and purified water is of no consequence**
- 4 .Water, USP, is not suitable for general pharmaceutical use because of considerable amount of dissolved solids present**

## Type of Water for Pharmaceutical use



Find More: <https://thepharmapedia.com/>

# Aromatic waters

provide a pleasantly flavored medium for the administration of water-soluble drugs and for the liquid phase of emulsion and suspensions. **Aromatic water are not** therapeutically potent because of the very small proportion of active ingredient present in them.

## Aromatic waters

- They are used in pharmacy as **pleasant** and **flavoring** medium or **vehicle** for administration of water-soluble drugs in order to **mask** the undesirable taste and odor of the drugs

## TYPES OF AROMATIC WATERS

• 2 TYPES OF AROMATIC WATERS:-

1. **SIMPLE AROMATIC WATER** --- contain purified water as solvent not alcohol , used mainly as vehicle like chloroform water.

2. **CONCENTRATED AROMATIC WATER**----- contains alcohol as solvent like conc. Peppermint water.

## Examples of Aromatic waters

1. Aromatic waters prepared from essential oils e.g. **peppermint water**, have been used as **carminative** and as **vehicle**.
2. **Chloroform water**: was used in **expectorant** preparations
3. Several aromatic waters are not used as vehicles for oral medication. These include: **Rose water**, **Hamamelis water** and **camphor water**.

# Peppermint water and oil



## Uses of Peppermint water:

- It is used as **antispasmodic** and **carminative**.
- It is one of the most popular aqueous vehicle.
- It is used as ingredient in **mouth washes** because **menthol** give a **pleasant** and **cool** sensation on mucous membrane.



# Rose water



# rose·wa·ter

\ˈrōz-, wə-ˈtər, - wā-\

Rosewater is created by distilling rose petals with steam. The fragrant liquid has anti-inflammatory and anti-bacterial properties that help to hydrate and soothe skin.

HUEE  
POST

Rose water ointment, or cold cream, was used as a soothing, cooling application for superficial lesions of the skin



# Camphor water



frequently used in eye drops for its refreshing properties

Other uses of Camphor: it is frequently used as rubefacient, Soothing eye, soothing cough



# Hamamelis waters



Hamamelis water or witch Hazel, is employed commonly as a **rub** and also is used as an **astringent** and **perfume** in aftershave lotion and other cosmetic products.

## Preparation of aromatic water

1. Distillation method
2. Solution method
3. Alternate solution method
4. dilution method.

## I. Distillation method

- **Rose water**, **hamamels water**, **camphor water**, **peppermint water** and **orange flower water** are prepared by this method because they are prepared directly from fresh plant materials.

# Distillation

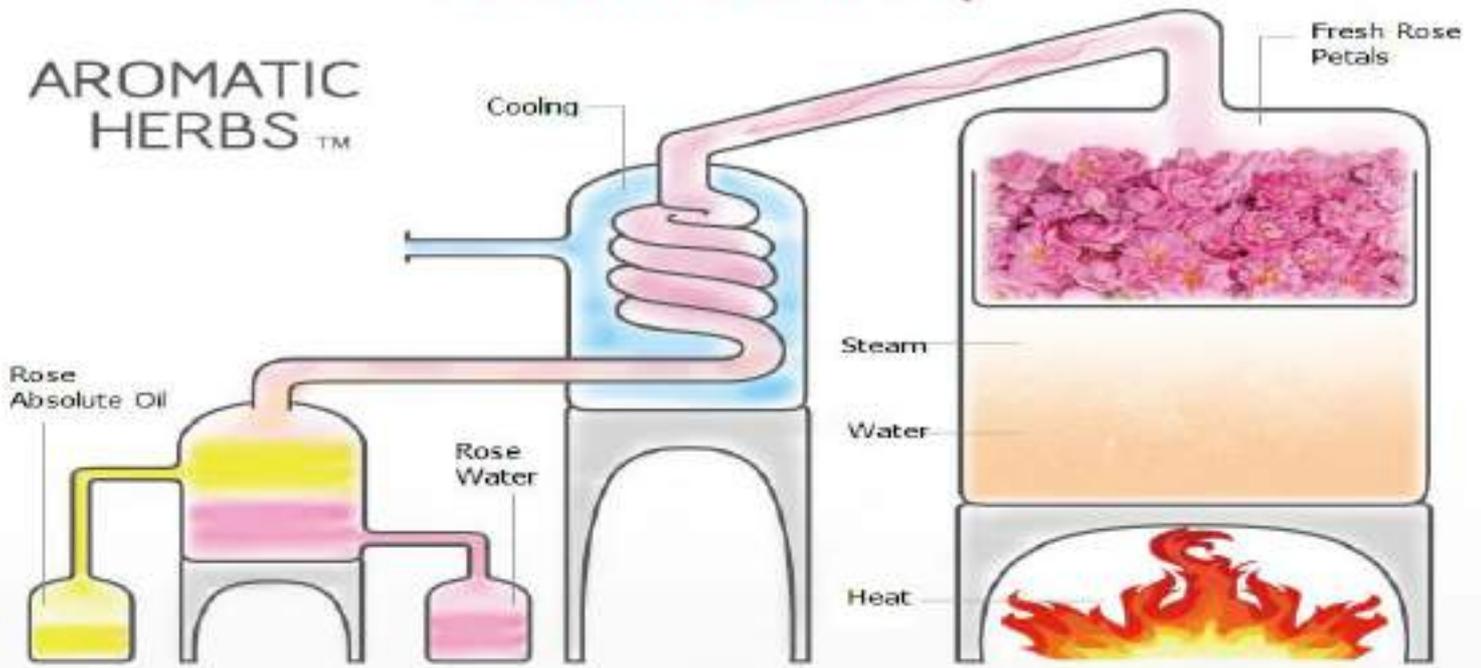
The distillation method consists of placing the odoriferous portion of the plant in a suitable still with sufficient purified water and then distilling most of the water, carefully. The excess oil is separated from the distillate.

rose water, Hamamelis water prepared by distillation only

. However, it is not practical or economically to use this method in most cases, since other method is of low cost and with simple apparatus required.

# Steam Distillery

AROMATIC  
HERBS™



## 2. Solution method

- the essential oil which contains the aromatic material is **agitated** with purified water (2ml or 2gm of aromatic materials agitated with 1000ml of water ) in a closed container for 15 minutes then the mixture is set aside for at least 12 hour longer to permit the excess oil and solid substance to settle. then filter through **wetted** filter paper, Then pass enough purified water through the filter paper to make the product measure 1000 ml.

## Chloroform water

- Chloroform oil                      2ml
- p.w                                      1000ml

- It is prepared by solution method **but without filtration** .it is prepared by placing excess amount of chloroform in a bottle then add water and shake vigorously .**some of chloroform dissolve in water** and form aromatic water and **excess will settle down on the bottom** of the bottle because it is heavier than water (there is no clarification problem).

## The disadvantage of solution method

- In spite of repeated filtration **it is difficult to get clear preparation** (the turbidity is related to the presence of fine particles of oil in the filtrate ) and this turbidity may be avoided by using boiling water and it consume time .

### **3. Alternate solution method**

- In this method the aromatic water is prepared by mixing 2ml of volatile oil with 15 gm of **talc powder** then add 1000ml of **p.w**
- mix then filter .
- this method offer time saving and clear solution example on this method is **peppermint water**.

## Disadvantage of alternate solution method

The purified talc pass through the filter paper because purified talc is subdivided too finely.

In order to remove finely divided material other material also used purified siliceous earth and pulped filter paper.

## 4. Dilution method

- **1** volume of concentrated aromatic water is diluted with **39** volume of water to get diluted solution
- example on this method is :  
**Peppermint water.**
- **Note:** concentrated aromatic waters are **40** times stronger than ordinary aromatic water.
-

# Stability of aromatic waters

1. many waters support the growth of mold. No preservatives are added to aromatic waters
2. Excessive exposure to light and to changes in temperature cause aromatic waters to lose some of their desirable characteristics

# **Mixtures (Liquid+Liquid) (Liquid+Solid) benefits and properties**

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# What is mixture(##)

**A mixture** is a liquid preparation meant for oral administration in which medicament or medicaments are dissolved , suspended or dispersed in a suitable vehicle. made up of two or more chemical components, are blended in the form of solutions, suspensions, or colloids.



# Types of liquid- liquid mixtures(##)

There are **two** types of liquid-liquid mixtures:-

## **1. Homogeneous Liquid-Liquid Mixture:**

**This is a type of liquid-liquid mixture whereby the two substances mix completely to form a single substance.**

Examples are:

- 1. Alcoholic with water.**
- 2. Juice (water mixed with flavorings).**



# Types of liquid- liquid mixtures

## 2- **Heterogeneous Liquid-Liquid Mixture:**

This is a type of liquid-liquid mixture whereby the two substances mixed together form a new substance which is not uniform, both substances of the mixture can be seen.

Examples are:

**Oil mixed with water(##).**



# The properties of mixtures(##)

The properties of mixtures are listed below.

1. The components of a mixture each keep their original properties.
2. The separation of components can be easily done.
3. The proportion of the components is variable.



# Solid – Liquid Mixture



liquid material

The solid – liquid mixture is a combination of solid and liquid materials.



Solid material



# **ADVANTAGES of mixtures(##)**

- 1. Easy to administer.**
- 2. Suitable for insoluble drug.**
- 3. Suitable for immiscible drug.**
- 4. The bioavailability is more compare to solid dosage form.**
- 5. Used for Drug causing stomach pain**



# CLASSIFICATION of liquid-liquid mixtures(##)

1. **Simple mixture** containing soluble substances (. E.g.: Carminative mixture, Expectorant mixture )
2. **Mixture containing Precipitate forming liquids** :-Certain liquid preparations contain resinous matter. when mixed with water, the resin is precipitated - which may adhere to sides of bottle or - form a clotted precipitate. This will not re-diffuse upon shaking. To prevent this, suspending agent is used. Ex. (resin extract, tinctures etc.)



# **STORAGE OF MIXTURES(##)**

**Mixtures are dispensed in plain glass bottles with uniform internal diameter. The mixture should be dispensed and supplied to the patient for not more than 3 days to prevent deterioration. The bottle should be fitted with a suitable cork which ensures its easy removal and to prevent spilling of Mixture.**



# LIQUID –SOLID MIXTURES (##)

The most common solid-liquid mixtures is a solution, where the solid is dissolved in the liquid.

Other mixtures include **suspensions** (e.g., many liquid antibiotics) and **colloidal** solutions (eye drops).

**gels**



# Types of liquid-solid mixtures (##)

1. In pharmaceutical terms, **solutions** are “liquid preparations that contain one or more chemical substances dissolved in a suitable solvent or mixture of mutually miscible solvents” (aqueous or non –aqueous).

It may be classified as oral, otic, ophthalmic, or topical.



# Types of liquid-solid mixtures(##)

## 2- **Suspensions** :

**Suspensions are called to those that do not reach the state of dissolution because the particles of the solid can be seen with the naked eye or with a microscope: this gives the compound a cloudy appearance.**



**MIBIOME™**  
Advanced Topical Suspension  
Formulated with SEKDA™  
Probiotic Complex

For excessively dry, red,  
irritated or scaly skin,  
prone to itching\*



50ml e 1.7fl. oz

Dye free • SLS and SLES free  
Steroid free  
All natural ingredients



**MIBIOME™**  
Advanced Topical Suspension  
Formulated with SEKDA™ Probiotic Complex

For excessively dry, red, irritated or  
scaly skin, prone to itching\*

Soothes and Rebalances  
Dermatologically tested

50ml e 1.7fl. oz

• SLS and SLES free • Steroid free • All natural

**250mg / 5ml**  
**60 ml**

**cefalexina**  
Suspensión Oral BP

**CEFALEXINA**  
Suspensión Oral BP  
500 mg/5ml

**KENALOG®-40**  
(Triamcinolone Acetonide)  
Injectable Suspension, USP  
400 mg per 10 mL  
10 mg per mL  
10 mL Multiple Dose Vial

**KENALOG®-40**  
(Triamcinolone Acetonide)  
Injectable Suspension, USP  
40 mg per 1 mL

**KENALOG®-10**  
(Triamcinolone Acetonide)  
Injectable Suspension, USP  
50 mg per 5 mL  
10 mg per mL  
5 mL Multiple Dose Vial

# Pharmaceutical Suspensions



# Types of liquid-solid mixtures (##)

## 3- Colloids :

Colloids are called combinations whose particles can only be seen under the electron microscope, together they form a clear aspect that denotes the presence of a solid in combination with a liquid.

Ex-Colloidal silver in the name of **Argyrols**, it acts as antiseptic for eye infection., **aerosol**.



# Eye lotions

- There are various eye lotions that are prepared by colloidal solutions.
- Arggyrol and protargyrol



# Types of liquid-solid mixtures(##)

4-Gels :

**Finally, the gels are the solid-liquid combinations that constitute an intermediate state, not formally fulfilling the characteristics of either of the two groups.**



# VOLTAREN GEL

The standard recommended Voltaren Gel dosage for treating osteoarthritis



# PHARMACEUTICAL CALCULATIONS OF DOSAGE FORMS

SP.PH  
AL`AA KOSAY

# Dosage forms

Defined as the physical form of a drug such as **solid** , **liquid** ,or **gas** by which it can be delivered in proper form to particle parts within the body.

form in which they are **marketed** for use

# Pharmaceutical dosage form

## Definition:

- ✓ Dosage forms are the means by which drug molecules are delivered to sites of action within the body.
- ✓ They are designed to facilitate the administration of drug substances.
- ✓ Dosage forms are also called ***drug delivery systems***.

# Why we need dosage forms

Patient safety

Drug safety

## **NEED FOR DOSAGE FORMS.....**

- **Safe and convenient delivery of accurate dosage**
- **To protect the drug substance from the destructive influences of atmospheric oxygen or humidity (coated tablets, sealed ampoules).**
- **To protect the drug substance from the destructive influence of gastric acid after oral administration (enteric-coated tablets).**
- **To conceal the bitter, salty, or offensive taste or odor of a drug substance (capsules, coated tablets, flavored syrups).**
- **To provide liquid preparations of substances which are either insoluble or unstable in the desired vehicle (suspensions).**
- **To provide clear liquid dosage forms of substances (syrups, solutions).**

# Types of Dosage Forms

## Classifications Based on Route/ Method of Administration

- Oral Dosage Forms
- Rectal Dosage Forms
- Respiratory/Inhaled Dosage Forms
- Ophthalmic Dosage Forms
- Otic Dosage Forms
- Topical Dosage Forms
- Parenteral Dosage Forms
- Vaginal Dosage Forms
- Nasal Dosage Forms

## Classifications Based On the Physical Form of the Dosage Form

- Solid Dosage Forms
- Semi-solid Dosage Forms
- Liquid Dosage Forms
- Gaseous Dosage Forms

## Pharmaceutical calculations

- **Pharmaceutical calculations is the area of study that applies the basic principles of mathematics to the preparation and **safe** and **effective** use of pharmaceuticals**

# Common and Decimal Fractions

## Common fractions

are portions of a whole, expressed at  $1/3$ ,  $7/8$ , and so forth. They are used only rarely in pharmacy calculations nowadays. It is recalled, that when adding or subtracting fractions, the use of a common denominator is required. The process of multiplying and dividing with fractions is recalled by the following examples.

# Common Fractions

Example:

If the adult dose of a medication is 2 teaspoonful (tsp.), calculate the dose for a child if it is  $\frac{1}{4}$  of the adult dose

The answer

$$\frac{1}{4} * 2 \text{ tsp.} / 1 = 1 * \frac{2}{4} * 1 = \frac{1}{2} \text{ (tsp.)}$$

# Common and Decimal Fractions

NOTE: When common fractions appear in a calculations problem, it is often best to **convert** them to **decimal fractions** before solving

Decimal fraction is a fraction with a denominator of 10 or any power of 10 and is expressed decimally rather than as a common fraction. Thus,

$1/10$  is expressed as **0.10** and  $45/100$  as **0.45**

Example

If a **child's** dose of a cough syrup is  $3/4$  **teaspoonful** and represents  $1/4$  of the **adult** dose, calculate the corresponding **adult** dose?

- To convert a **common fraction to a decimal fraction**, **divide** the denominator into the numerator.

$$1/8 = 1 \div 8 = 0.125$$

- To convert a **decimal fraction to a common fraction**, express the decimal fraction as a **ratio** and reduce.

$$0.25 = 25/100 = 1/4$$

# Units of measurement used in Pharmacy

## 1. Avoirdupois System

- mainly used in measuring bulk medication encountered in manufacturing.
- Commonly used to measure weight
- Standard measure for weight is grain (**gr**)

Pound (lb)	Ounces (oz)	Grains (gr)
1 =	16 =	7000
	1 =	437.5



# Units of measurement used in Pharmacy

## 2. Apothecary System

- Commonly used for prescribing and dispensing medication
- Commonly used for measuring volume
- Standard of measure for weight is grain (gr)
- Standard of measure for volume is minim (℥)



# Units of measurement used in Pharmacy

## 3. Metric System

- is based on the decimal system in which everything is measured in multiples or fractions of 10.
- major systems of weights and measurement used in medicine.
- Uses standard measures:
  - Gram for weight (g)
  - Liter for volume (l)
  - Meter for length or distance (m)



# The Metric System

- Uses standardized units of Systeme International (SI)
- Three basic units
  - Meter (distance, little use in pharmacy)
  - Gram (weight, used for solid form meds)
  - Liter (volume, used for liquid meds)
- Numbers expressed as decimals rather than fractions



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**CONVERSION EQUIVALENTS OF VOLUME**

1 drop (gtt)	=	0.05 mL
1 mL	=	20 drops
1 teaspoonful	=	5 mL
1 tablespoonful	=	15 mL
1 mL	=	16.23 minims
1 minim	=	0.06 mL
1 fluid dram	=	3.69 mL
1 fluid ounce	=	29.57 mL
1 pint	=	473 mL
1 quart	=	946 mL
1 gallon	=	3,785 mL

**CONVERSION EQUIVALENTS OF WEIGHT**

1 g	=	15.432 grains
1 kg	=	2.20 pounds (av)
1 grain	=	64.8 mg
1 ounce (av)	=	28.35 g
1 ounce (ap)	=	31.1 g
1 pound (av)	=	454 g
1 pound (ap)	=	373 g
1 pound (av)	=	7,000 grains
1 pound (ap)	=	5,760 grains
1 grain (av)	=	1 grain (ap)

**CONVERSION EQUIVALENTS OF LENGTH**

1 inch	=	2.54 cm
1 m	=	39.37 inches

**METRIC MEASURES OF LENGTH**

- 100 centimeters (cm) = 1 meter (m)
- 10 millimeters (mm) = 1 centimeter (cm)
- 1,000 micrometers ( $\mu\text{m}$ ) = 1 millimeter (mm)

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## Dosage in Pediatrics.

In Pediatrics, it is necessary to calculate the dose to be administered according to the weight in Kilograms (Kg) or the Body Surface.

## CALCULATING SAFE PEDIATRIC DOSAGES

- **Pediatric patients**, which include both infants and children, require special dosing that is adjusted for their
  - 1- **body weight**. the most commonly used method is stated as mg/kg
  - 2- **A number of formulas** have been used throughout the years to determine the best dose for pediatric patients
  - 3- **by Body Surface Area**.

# Dosage in Pediatrics.

It is also important to pay attention to the **Dosage of the medicine**. Some medications bring their dose expressed in **a total** to be administered during the **day**. While others express it in doses to be administered every certain **number of hours**.

For example: the Paracetamol Dose is **10-15 mg / Kg / dose every 6h**. This means that this dose can be repeated every 6 hours. But the Cefixime Dose is **8mg / Kg / Day**.

## Pediatric dose calculation according to weight in kg

The first thing we must do is Calculate the total Dose to be administered of the Medication. Which we obtain by **multiplying** the Dose by the Weight of the Patient.

## Calculate the Dose of Paracetamol.

For example the Dose of Paracetamol is 10-15 mg / Kg / dose. This means that we can use a dose of at least 10 and a maximum of 15 mg. In this example we will use a 15 mg dose in a child weighing 12 kg. Therefore, the total dose to be administered is:

**Total dose = (Weight of the patient in kg) x (dose of Drug)**

**Total dose  $\Rightarrow$  (12 Kg) x (15mg) = 180 mg**

# Home work

- In the case of Paracetamol Syrup, the most common concentration is 120mg / 5ml.
- Dose of Paracetamol is 10-15 mg / Kg / dose
  
- So, How many mL/dose should we give to a patient weighing 15 kg?

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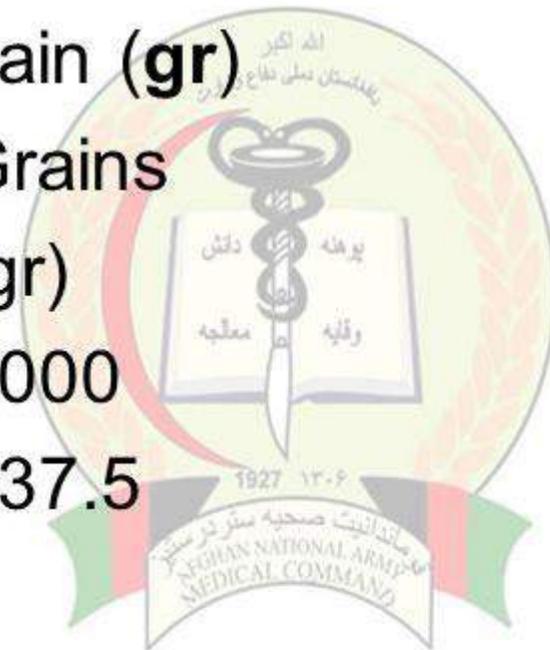
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