Introduction

- **Compounding** includes the preparation, mixing, assembling, packaging or labeling of a drug in response to a prescription written by a licensed practitioner.
- **Extemporaneous compounding** is defined as the timely preparation of a drug product according to a physicians prescription, a drug formula, or a recipe in which calculated amounts of ingredients are made into a homogenous (uniform) mixture.
  - Extemporaneous compounding is done when certain medical needs of individual patients cannot be met by the use of an approved commercial drug product.

DISPENSING

- Selection, preparation and transfer of one or more doses of a drug to a patient
- Requires extensive knowledge of-

1. Stability of medicines and other ingredients
2. Principles of compounding
3. Dosage
4. Incompatibilities between the ingredients
5. Packaging methods
6. Labeling procedure

DISPENSING PROCEDURE

- Work on your own with confidence
- Wear a freshly laundered coat
- Provide yourself with with a clean cloth , swab or duster
- Work in clean and tidy manner
- Receive and read the prescription carefully to understand
- Adjusting the order as per approved policy
- Checking therapeutic correctness of prescription
- Entry of order

- Making recommendation to the prescriber
- If necessary find the formula of preparations in appropriate sources of information
- Selecting the drug or determine the product to dispense
- Check the doses of internal preparations
- Checking the expiry date
- Reconstitute the product as per the requirement
- Checking the harmful effects of ingredients if any
- Prepare the preparation as per the standard methods
- Look the storage conditions
- Work out and check the calculations
- Collect the correct container and closures

- Make the preparations and pack into the container and label it
- Labeling the product ,if necessary trim the label
- Check the finished preparations
- Wrap the container and write the patient name and address on wrapper
- Make the appropriate records
- Maintain, preparing and operating equipment

PRESCRIPTION PROCESSING

- Collect important information relating to the patient
- Carefully read the prescription for quantity and dose
- Dispensed prescription should be compared with their original one
- Check the label of large quantity container
- Properly affix the label on container
- Final checking of filled prescription
- Following information should be clearly mentioned in prescription-

1. Name, weight and age of patient
2. Type of disease
3. Any allergic reactions
4. Contact person on delivered prescription

SOURCES OF INFORMATION

1. Official books- IP, USP, BP, BPC, EP
2. Referance Books- Remingtons pharmaceutical sciences, national formulatery, drug today, pharmaceutical handbooks-
3. Journals
4. internet

Prescription is an order written by a physician, dentist, veterinarian or a registered medical practitioner to a pharmacist to compound and dispense a specific medication for the patient.

Important features of a prescription:

- Directions are given to the pharmacist about what type of preparation (tablet, power, mixture etc.) is to be prepared.
- It contains directions for the patients, the dose of the drug and the dose interval, and how it is to be taken.

Juan Dela Cruz, MD

Tower A Bldg., Boni Ave, Mandaluyong City
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Clinic Schedule:

Monday: 1:00PM – 5:00PM
Tue – Thur: 10:00AM – 3:00PM

Friday: 9:00AM – 12:00PM
Saturday: 12:00PM – 3:00PM

Name: Sarah Gonzales

Address: Boni Avenue, Mandaluyong City

Age: 8 Sex: F Date: 6/21/2012

Rx

Amoxicillin 250mg/5ml Susp.

2 bots

Reconstitute with water to make 60 mL suspension

Sig. Take 1 tablespoon TID for VII days

Physician's Sig. Jddgaruz
Lic. No. 13548
PTR No. 1234567
S2 No.

PARTS OF A PRESCRIPTION

A typical prescription consists of the following parts:

Top- physicians information

1. Date

Date on the prescription helps the pharmacists to know when the medicines were last dispensed if the prescription is brought for redispensing of the prescription.

In case of habit forming drug the date prevents the misuse of the drug by the patient.

2. Name, age, sex and address of the patient

By name and address the patient and the prescription can be identified.

Age and sex of the patient is especially required for child patient to check the prescribed dose.

3. Superscription

- It is represented by a Latin symbol $\mathbf{R_X}$, an abbreviation of Latin term 'recipe' which means 'take thou' or 'you take'.

[In olden days, the symbol was considered to be originated from the **sign of Jupiter, the Greek God of healing**. This symbol was employed by the ancient in requesting God for the quick recovery of the patient.]

4. Inscription

- This is the main part of the prescription. It contains the names and quantities of the prescribed medicaments.

- The medicament may be official preparation or nonofficial preparation.

If is official preparation (i.e. from pharmacopoeia or formulary) then only the name of the preparation is written e.g. Piperazine Citrate Elixir IP.

If it is nonofficial preparation then the quantity of each ingredient will be given. The type of preparation will also be given e.g.

Sodium bicarbonate	3g
Simple Syrup	6ml
Purified Water q.s.	100ml

5. Subscription

- In this part the prescriber gives direction **to the pharmacist** regarding the dosage form to be prepared and the number of doses to be dispensed.

6. Signatura

- It is usually written as '**Sig.**'.
- In this part the prescriber gives direction **to the patient.**
- The instructions given in the prescription should also be written in the label of the container so that the patient can follow them.
- The instructions may include:

(a) The quantity to be taken
(b) The frequency and timing of administration of the preparation
(c) The route of administration
(d) The special instruction (if any)

7. Renewal instructions

- The prescriber indicates in every prescription, whether it may be renewed, and if so, for how many times. It is very important particularly for the case of habit forming drugs to prevent its misuse.

8. Signature, address and registration number of the prescriber

- The prescription must be signed by the prescriber by his / her own hand.
- His/her address and registration number should also be written .

9. Other imp instructions

1. Qty: how much is in the package
2. Mfg: name of manufacturer
3. Take full course
4. Take with or without food
5. Take four times a day
6. Take as needed as symptoms permits

TYPES OF PRESCRIPTION

1. Central government health scheme prescription (CGHS)-

a) Prescriptions are for those who come under the health scheme of government

b) Not charged

c) After dispensing medicines, prescription are sent to account for pricing

d) Prescription bears common information and column for pricing

2. Private prescription-

a) Fully charged prescription

b) Except for controlled drug substances, theses prescriptions are returned to the patient

3. Hospital prescription- two types

In patient prescription

Out patient prescription

4. Veternary prescription

HOSPITAL PRESCRIPTION

- A) In patient prescription-

a) Prescription for the patients are written on the physicians order form
b) Physicians order forms are written as multiple copies for utilization in pharmacy, in nursing station and attached to patient medication record
c) Prescription bears information regarding hospital name, ward number, period of stay, date and time of admission and discharge of patient
d) Should have space to note time of administration and a column to keep record of change in therapy with prescribers initials
e) After discharge of the patient theses prescriptions are filled with patient medication records
f) Charged or not charged depend on health scheme
g) Charges may be included in hospital charges

f)Medicines are usually prescribed in one week or for 15 days doses

- B) Outpatient prescription-

a) Format is similar to private prescription

b) They are charged on uncharged as per health scheme

c) Medicines are supplied in sufficient quantities till the next appointment

d) Records of prescription included in patients medical record

VETERINARY PRESCRIPTION

- Written for the animals
- State type of animal, weight, breed and colour along with the name and detailed address of owner

E.g.

Animal- dog Breed- Australian

Name of the owner- weight-

Address-

HANDLING OF PRESCRIPTION

- The following procedures should be adopted by the pharmacist while handling the prescription for compounding and dispensing:

Dispensing

(i) Receiving

(ii) Reading and checking

(iii) Collecting and weighing the materials

(iv) Compounding, labelling and packaging

(i) Receiving

- The prescription should be received by the pharmacist himself / herself.

- While receiving a prescription from a patient a pharmacist should not change his/her facial expression that gives an impression to the patient that he/she is confused or surprised after seeing the prescription.

(ii) Reading and checking

- Reading the prescription and checking for
  - Legality
  - Legibility
  - Completeness and correctness .

A. Legality

- A prescription is legal when:
  - It is written (can also be typed) by a R.M.P
  - Signed by the R.M.P
  - Has all the information required to be contained with respect to part of prescription.

B. Legibility

- Legibility is a problem requiring alertness and critical judgment on the part of the pharmacist.

- Careless handwriting and similarity in spelling of names of different drugs add to the difficulty.

  Example – Prednisone and Prednisolone

  Digoxin and Digitoxin

- When handwriting is illegible, the best thing to do isto contact the physician over the phone andconfirm.

3. Collecting and weighing the material

- Before compounding a prescription all the materials required for it should be collected from the shelves or drawers and kept in the left hand side of the balance.
- After measuring each material should be kept on the right hand side of the balance.
- After compounding the prescription the materials are replaced back to the shelves / drawers where from they were collected.

- While compounding the label of every container of material should be checked thrice in the following manner:

(i) When collected from the shelves/drawers.
(ii) When the materials are measured.
(iii) When the containers are replaced back to the shelves/drawers.

4. Compounding, labeling and packaging

- Only one prescription should be compounded at a time.
- Compounding should be done on a clean table.
- All equipment required should be cleaned and dried.
- The preparation should be prepared according to the direction of the prescriber or as per methods given in pharmacopoeia or formulary and are according to established pharmaceutical art of compounding.
- The compounded medicament should be filled in a suitable container with appropriate label depending upon the quantity and use.
- While delivering the prescription to the patient, the pharmacist should explain the mode of administration, direction for use and storage.

- The filled containers are suitably labeled
- Paper of good and proportional quality should be used for label
- Label affixed with good quality label
- Containers should be polished

EQUIPMENT FOR WEIGHING, MEASURING, AND COMPOUNDING

- **Balances:** Balance measurements using a counterbalance are made using sets of standardized pharmaceutical weights.

  An electronic balance is easier to learn and use and is more accurate than other types of balances.

The balances should be installed into stable platforms

Calibrated

Weights should be handled with the forceps and kept on left pan of the balance and material on the right side

After weighing weights should be kept on the proper place

- **Forceps and Spatulas:** Forceps should be used when picking up weights so that moisture and oils are not transferred to the weights. Spatulas are used in compounding tasks such as preparing ointments and creams or loosening material from the surfaces of a mortar and pestle.

EQUIPMENT FOR WEIGHING, MEASURING, AND COMPOUNDING

- **Compounding Slab:** This is an ideal surface for mixing compounds because of its nonabsorbent surface.
- **Mortar and Pestle:** The coarser the surface of the mortar and pestle, the finer the triturating, or grinding, that can be done.
- **Measuring- Graduates and Pipettes:** Graduates come in two varieties: conical and cylindrical.
- Measuring cylinder is easier to read and more accurate and reliable
- A pipette is used for measuring liquids with a volume

EQUIPMENT FOR WEIGHING, MEASURING, AND COMPOUNDING

- **Master Formula Sheet:** Prepared by the pharmacist, this sheet indicates the amount of each ingredient needed, lists the procedures to follow, and provides the labeling instructions.

PRODUCT _____ MTC LOT NUMBER _____

LABEL: Date MFG:
MAGIC MOUTHWASH

Take 1 teaspoonful 3 times daily. Swish and swallow.

STRENGTH:

QUANTITY MFG:

	MANUFACTURER'S LOT NUMBER	INGREDIENTS	AMOUNT NEEDED	WEIGHED OR MEASURED BY	CHECKED BY
1		Decadron or hydrocortisone	4.5 mg 120 mg		
2		nystatin (Mycostatin)	2,000,000 units		
3		tetracycline	1 g		
4		diphenhydramine (Benadryl)	qs to 120 mL		
5					
6					
7					
8					

DIRECTIONS FOR MANUFACTURING

1. Draw up, by syringe, 4.5 mg Decadron or 120 mg of hydrocortisone or equivalent steroid.
2. Crush nystatin tablets and mix with 5 mL sterile water or measure 2,000,000 units of liquid.
3. Measure 1 g of liquid tetracycline or dissolve tablets or capsules in 5 mL sterile water.
4. Add each ingredient to liquid container and qs with diphenhydramine to 120 mL.
5. Attach label.

Manufactured by _____
Approved by _____
Date _____

Auxiliary Labeling: SHAKE WELL

PRESCRIPTION

- 1 Abbreviation- care should be taken by the pharmacist while interpreting the abbreviations

e.g. Achro may be achromycin or achrostatin

- Name of the drug- certain names looks like or sounds like same

e.g. digitoxin and digoxin

Prednisone and prednisolone

- Strength of preparations- should be stated by prescriber

it will be wrong decision on the part of pharmacist to dispense 500mg paracetamol tablet when it is not written on prescription

- Dosage form of drug prescribed-many medicine available in various dosage form e.g. liquid, capsule

it should be written on prescription

- Dose- Paedriatic doses cause problem
- Instructions for the patient- incomplete information for instructions given to patient

e.g. dose , qty of drug to be taken, frequency

- Incompatibilies- different medicines given to same patient should not interact
- e.g. certain antibiotics should not be given with milk

PRICING THE PRESCRIPTION

- Very difficult task
- Public always feels that price charged is high (alleged and interrogated for price)
- Main reason for allegation in high pricing is great variation in prices charged by various pharmacist
- He should be extremely polite and truthful
- The reason for price changed should be convincing
- It may be due to constant change in prices of ingredients, drugs and other services
- While pricing it should have clear policy and work within the framework of rule and rationalize the price
- Things which governs the price of prescription-cost of ingredients, labor cost, cost of containers and professional services and lastly the profit

- Cost of ingredients should be calculated without profit and tables containing the price of each ingredients should be maintained
- Container cost should be calculate by taking consideration into damage or breakage
- Cost of labour-time required for the purpose

e.g. in western countries time required for noncompounded prescription- 8 min

Compounded prescription- 14 min

In india there are no norms for time based schedule

Professional fees is unacceptable to the patient

Overhead charges differs from pharmacy to pharmacy e.g. rent charges,, electricity bills, insurance, internet advertising etc has to be charged extra

Net profit should added to this charges

FILING OR RECORDING OF THE PRESCRIPTION

- Filing of prescription is needed- future service to patient, calculating statistics, any legal issues
- Filing and maintaining records depends on how frequently one has to refer it
- In some govt hospitals originals prescription is not retain by pharmacist, patient is allowed to take it
- On authorization by physician patient reproduce the prescription for refilling
- A register is maintained with all prescriptions dispensed date wise
- The register has number of columns for recording the salient features e.g serial number, date, name of the patient, inscription
- Another method is to retain original prescription

Types of dispensed preparations (Cont.):

They are classified according to:

Physical form

Solid

Semisolid

liquid

SOLID DOSAGE FORMS:

1-Tablet:

A tablet is a hard, compressed medication in round, oval or square shape.

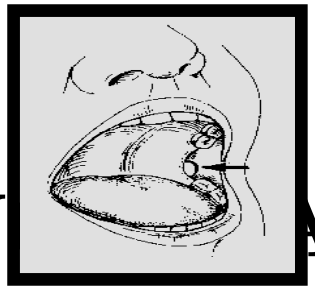
The excipients include:

- diluent, binders, glidants (flow aids) and lubricants to ensure efficient tabletting.
- Disintegrants to ensure that the tablet breaks up in the digestive tract.

-Sweeteners or flavours to mask the taste of bad-tasting active ingredients.

- Pigments or coluring agents to make uncoated tablets visually attractive.
- They are prepared by moulding or usully compression

.

-BU  AND S  NGUAL TABLET:

- Sublingual and buccal medications are administered by placing them in the mouth, either under the tongue (sublingual) or between the gum and the cheek (buccal).

- The medications dissolve rapidly and are absorbed through the mucous membranes of the mouth, where they enter into the bloodstream.

- Avoid the acid and enzymatic environment of the stomach and the drug metabolizing enzymes of the liver.

- Examples of drugs administered by this route: e.g. vasodilators, steroidal hormones.

-EFFERVESCENT TABLET:

Effervescent tablets are uncoated tablets that generally contain acid substances (citric and tartaric acids) and carbonates or bicarbonates and which react rapidly in the presence of water by releasing carbon dioxide.

-They are intended to be dissolved or dispersed in water before use providing:

A- Very rapid tablet dispersion and dissolution.

B- Pleasant tasting carbonated drink.

- CHEWABLE TABLET:

- They are tablets that chewed prior to swallowing.
- They are designed for administration to children e.g. vitamin products.

Hard gelatin capsule Soft gelatin capsule

2- CAPSULE:

A capsule is a medication in a gelatin container.
available in variety of sizes

- Advantage: mask the unpleasant taste of its contents.

- The two main types of capsules are:

1- Hard-shelled capsules, which are normally used for dry, powdered ingredients.

Consist of a cylindrical body and cap both with hemispherical end

Made from gelatin and water with added preservative

2- Soft-shelled capsules, primarily used for solids, liquids oils, semisolids and for active ingredients that are dissolved or suspended in oil.

May be spherical, ovoid, cylindrical with hemispherical end

Consist of glycerin ,water, glycerol for flexibility

No.	Capsule no.	Volume, ml	Content, mg
1	000	1.36	650-1000
2	00	0.95	390-1300
3	0	0.67	325-910
4	1	0.48	225-650
5	2	0.37	195-520
6	3	0.27	130-390
7	4	0.20	95-260
8	5	0.13	60-120

Different sizes of hard gelatin capsules

3- LOZENGE:

-It is a solid preparation consisting of sugar and gum, the latter giving strength and cohesiveness to the lozenge and facilitating slow release of the medicament.

- It is used to medicate the mouth and throat for the slow administration of indigestion or cough remedies.
- Available in various shapes and sizes like round , disc shaped, rectangle, oval, cylindrical in shape
- Can be used as antiseptic, anti-inflammatory, antibiotics, expectorants.

4- PASTILLES:

They are solid medicated preparations designed to dissolve slowly in the mouth.

They are similar but softer than lozenges and their bases are either glycerol and gelatin, or acacia and sugar.

Should dissolve very slowly

5- Dental Cones:

- A tablet form intended to be placed in the empty socket following a tooth extraction, for preventing the local multiplication of pathogenic bacteria associated with tooth extractions.

- The cones may contain an antibiotic or antiseptic.

6-PILLS:

- Pills are oral dosage forms which consist of spherical or ovoid masses prepared from one or more medicaments incorporated with inert excipients.
- Pills are now rarely used.

7- GRANULES:

- They are consisting of solid, dry aggregates of powder particles often supplied in single-dose sachets.
- Means of administering drug possessing unpleasant taste
- To mask unpleasant taste drug is mixed with sugar, flavouring agent and inert adjuent moistened to produce coherent mass passed through sieve and dried
- Some granules are placed on the tongue and swallowed with water, others are intended to be dissolved in water before taking.
- Effervescent granules evolve carbon dioxide when added to water.
- Particle size-2 to 4 mm in diameter

8- POWDER (ORAL):

There are two kinds of powder intended for internal

1-*Bulk Powders* are multidose preparations consisting of solid, loose, dry particles of varying degrees of fineness. They contain one or more active ingredients, with or without excipients and, if necessary, coloring matter and flavoring substances.

- usually contain non-potent medicaments such as antacids since the patient measures a dose by volume using a 5ml medicine spoon. The powder is then usually dispersed in water or, in the case of effervescent powders, dissolved before taking.

2-*Divided Powders* are single-dose presentations of powder (for example, a small sachet) that are intended to be issued to the patient as such, to be taken in or with water.

9- POWDERS FOR MIXTURES:

- The mixed powders may be stored in dry form and mixture prepared by the pharmacist when required for dispensing , by suspending the powders in the appropriate vehicle.
- Dusting powder- free flowing very fine powder for external use

- INSUFFLATION: medicated dusting powders that are blown by insufflators into the region such as throat, body cavities, ear

10.CACHETS

- Enclosure in cachets provides a means of administering nauseous or disagreeable powders in a tasteless form
- Unit dosage form
- Moulded from rice paper
- Rice paper- a material made by pouring a mixture of rice flour and water between two hot polished revolving cylinders , after evaporation of water a sheet of wafer is formed
- Holding-0.2 to 2 g of powder
- Sealed by two types- wet and dry
- Wet seal-consist of two halves convex in shape and having a broad flange used for sealing
- Dry sealing- has a shallow cylindrical base and slightly larger slip over cap
- They are softened by immersion in water for few seconds and taken with water

SOLID DOSAGE FORMS:

11- Pessary:

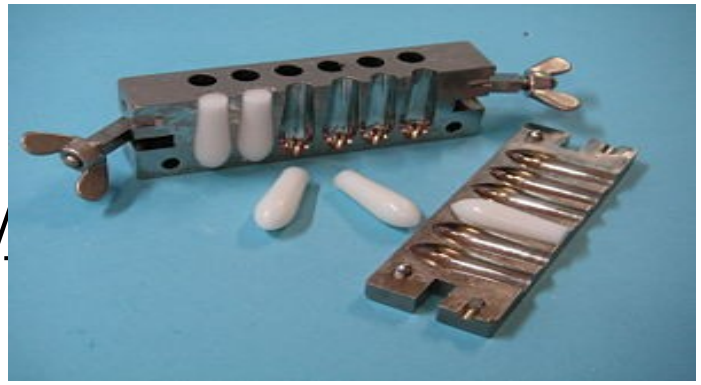
- Pessaries are solid medicated preparations designed for insertion into the vagina where they melt or dissolve.
- There are three types:

A- Moulded pessaries: they are cone shaped and prepared in a similar way to moulded suppositories.

B- Compressed pessaries: made in a variety of shapes and are prepared by compression in a similar manner to oral tablets.

C- Vaginal capsules: are similar to soft gelatin oral Capsules differing only in size and shape.

SOLID DOSAGE FORM



12- Suppository:

It is a small solid medicated mass, conical or ovoid in shape ,that is inserted either into the rectum (rectal suppository), vagina (vaginal suppository or pessaries) where it melts at body temperature

Used during constipation, inflammation, piles .

-LIQUID PREPARATIONS:

a- Oral solution:

Oral solutions are clear Liquid preparations for oral use containing one or more active ingredients dissolved in a suitable vehicle.

b- Oral emulsion:

Oral emulsions are stabilized oil-in-water dispersions, either or both phases of which may contain dissolved solids.

c-Oral suspension:

- Oral suspensions are Liquid preparations for oral use containing one or more active ingredients suspended in a suitable vehicle.
- Oral suspensions may show a sediment which is readily dispersed on shaking to give a uniform suspension which remains sufficiently stable to enable the correct dose to be delivered.

-LIQUID PREPARATIONS (CONT.):

d- Syrup:

- It is a concentrated aqueous solution of a sugar, usually sucrose.
- Flavored syrups are a convenient form of masking disagreeable tastes.

e- Elixir:

-It is pleasantly flavored clear liquid oral preparation of potent or nauseous drugs.

- The vehicle may contain a high proportion of ethanol or sucrose together with antimicrobial preservatives which confers the stability of the preparation.

LIQUID PREPARATIONS (CONT.):

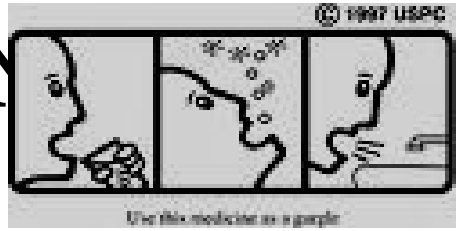
f- Linctuses:

- Linctuses are viscous, liquid oral preparations that are usually prescribed for the relief of cough.
- They usually contain a high proportion of syrup and glycerol which have a demulcent effect on the membranes of the throat.
- The dose volume is small (5ml) and, to prolong the demulcent action, they should be taken undiluted.

g- Oral drops:

Oral drops are Liquid preparations for oral use that are intended to be administered in small volumes with the aid of a suitable measuring device. They may be solutions, suspensions or emulsions.

-LIQUID PREPARATIONS (CON



h- Gargles:

- They are aqueous solutions used in the prevention or treatment of throat infections.
- Usually they are prepared in a concentrated solution with directions for the patient to dilute with warm water before use.

i- Mouthwashes:

Are aqueous solutions in concentrated form with pleasant taste

These are similar to gargles but are used for oral hygiene and to treat infections of the mouth.

Used for rinsing, deodorising, refreshing,

antiseptic

Medicaments used-zinc sulphate, zinc chloride,phenol,sodium peroxide

Along with this it contains additives like flavouring

agent, colouring agent, sweetening agent, glycerine, alcohol and surfactant

LIQUID PREPARATIONS (CONT.):

J. Draughts-

1. Liquid preparation prescribed for larger dose generally more than 50 ml
2. Each dose is issued in separate container

L. Gels- aqueous colloidal solution used to prevent or treat throat infections

LIQUID DOSAGE FORMS:

M- Eye drops:

Eye drops are saline-containing drops used as a vehicle to administer medication in the eye.

Depending on the condition being treated, they may contain steroids, antihistamines or topical anesthetics.

Eye drops sometimes do not have medications in them and are only lubricating and tear-replacing solutions.

LIQUID DOSAGE FORMS:

N- Ear drops:

- Ear drops are solutions, suspensions or emulsions of drugs that are instilled into the ear with a dropper.
- It is used to treat or prevent ear infections, especially infections of the outer ear and ear canal.

LIQUID DOSAGE FORMS

O- Nasal Drops and Sprays:

Drugs in solution may be instilled into the nose from a dropper or from a plastic squeeze bottle.

The drug may have a local effect, e.g. decongestant.

Alternatively the drug may be absorbed through the nasal mucosa to exert a systemic effect.

The use of oily nasal drops should be avoided because of possible damage to the cilia of the nasal mucosa.

LIQUID DOSAGE FORMS (CONT.).

P- Douches: medicated aqueous solution used for rinsing of body surfaces or body cavities like ear, nose, bladder, rectum and vagina (irrigation)

Commonly used for vaginal douche

Generally used for cleansing, antiseptic or astringent action

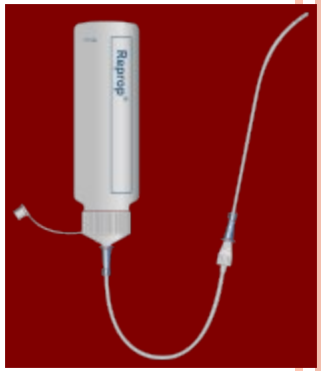
Medicament generally used e.g. potassium permanganate, lactic acid, tannic acid, sodium chloride,, glycerin

1. vaginal douches must be sterile

2. They are administered into the body using thin, soft, sterile rubber or plastic tube called catheter

3. generally dispensed as concentrated solution with direction of dilution

LIQUID DOSAGE FORMS (CONT.):



Q- Enema:

An **enema** is the procedure of introducing liquids into the rectum and colon via the anus.

Types of enema:

1- Evacuant enema: used as a bowel stimulant to treat constipation. E.g. soft soap enema & $Mgso_4$ enema

-The volume of evacuant enemas may reach up to 2 liters.

- They should be warmed to body temperature before administration.

LIQUID DOSAGE FORMS (CONT.):

- Retention enema:

- Their volume does not exceed 100 ml.
- No warming needed.

- May exert:

A- Local effect: e.g. a barium enema is used as a contrast substance in the radiological imaging of the bowel.

B- Systemic effect:

e.g. the administration of substances into the bloodstream. This may be done in situations where it is impossible to deliver a medication by mouth, such as antiemetics.

e.g. nutrient enema which contains carbohydrates, vitamins & minerals.

LIQUID DOSAGE FORMS (CONT.):

R- Collodion:

Collodion is a solution of nitrocellulose in ether or acetone, sometimes with the addition of alcohols.

- Its generic name is pyroxylin solution.

- It is highly flammable.

- As the solvent evaporates, it dries to a celluloid-like film.

LIQUID PREPARATIONS (CONT.):

S. INHALATIONS:

Liquid preparations containing volatile substances

Used to relieve congestion and inflammation of respiratory tract

Some are volatile at room temperature and used on handkerchief

Other are added to hot water and vapors are inhaled

T. LOTION-

Fluid preparations for external application without friction

Either dabbed into the skin or applied on suitable dressing covered with waterproof material

U. MIXTURES-

Liquid oral preparations

Aqueous solution or suspensions of medicament

Generally freshly prepared and given

V .PAEDIATRIC DROPS-

child preparations

Given by droppers

LIQUID DOSAGE FORMS (CONT.):

W- Liniments:

- Liniments are fluid, semi-fluid or, occasionally, semi-solid preparations intended for application to the skin.
- They may be alcoholic or oily solutions or emulsions.
- Most are massaged into the skin (e.g. counter-irritant).
- Liniments should not be applied to broken skin.

LIQUID DOSAGE FORMS (CONT.):

X- Paints:

- Paints are liquids for application to the skin or mucous membranes.

- Skin paints contain volatile solvent that evaporates quickly to leave a dry resinous film of medicament.

- Throat paints are more viscous due to a high content of glycerol, designed to prolong contact of the medicament with the affected site.

SEMISOLID DOSAGE FORMS:

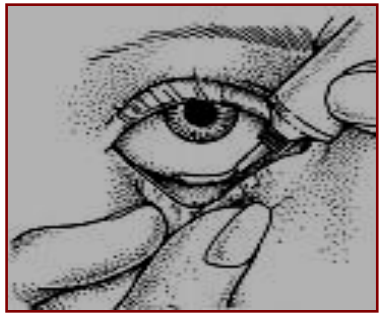
1. Ointments:

- Ointments are semi-solid, greasy preparations for application to the skin, rectum or nasal mucosa.

- The base is usually immiscible with skin secretions.

- Ointments may be used as emollients or to apply suspended or dissolved medicaments to the skin.

- **<u>Ophthalmic ointment & gel:</u>**
- These are sterile semi-solid
- Preparations intended for application
- To the conjunctiva or eyelid margin.



SEMISOLID DOSAGE FORMS (CONT.):

2- Creams:

- Creams are semi-solid emulsions, that is mixtures of oil and wate for external use
- They are divided into two types:

A- oil-in-water (O/W) creams: which are composed of small droplets of oil dispersed in a continuous aqueous phase.
Oil-in-water creams are more comfortable and cosmetically acceptable as they are less greasy and more easily washed off using water.

B- water-in-oil (W/O) creams: which are composed of small droplets of water dispersed in a continuous oily phase.

Water-in-oil creams are more difficult to handle but many drugs which are incorporated into creams are hydrophobic and will be released more readily from a water-in-oil cream than an oil-in-water cream.
Water-in-oil creams are also more moisturising as they provide an oily barrier which reduces water loss from the stratum corneum, the outermost layer of the skin.

SEMISOLID DOSAGE FOI (CONT

3- Gels (Jellies):

-Gels are semisolid system in which a liquid phase is constrained within a polymeric matrix (consisting of natural or synthetic gum) having a high degree of physical or chemical cross-linking.

-They are used for externally medication, lubrication and some miscellaneous applications like carrier for spermicidal agents to be used intra vaginally .

4- Poultice:

It is soft, viscous, pasty preparation for external use. They are applied to skin while they are hot. Poultice must retain heat for a considerable time because they are intended to supply warmth to inflamed parts of body.

E.g. Kaolin poultice (B.P.C.)

SEMISOLID DOSAGE FORMS (CONT)

5- Pastes :

- Pastes are basically ointments into which a high percentage of insoluble solid has been added

-The extraordinary amount of particulate matter stiffens the system.

-Pastes make particularly good protective barrier when placed on the skin, the solid they contain can absorb and thereby neutralize certain noxious chemicals before they ever reach the skin.

- Like ointments, paste forms an unbroken relatively water – impermeable film unlike ointments the film is opaque and therefore can be used as an effective sun block accordingly.

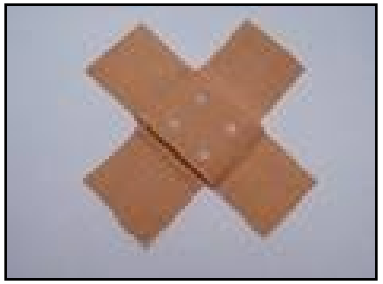
-

6-Plasters:

- Plasters are solid or semisolid masses adhere to the skin when spread upon cotton felt line or muslin as a backing material and they are mainly used to,

A- Afford protection and mechanical support.

B- Bring medication into close contact with the surface of the skin.



OTHER DOSAGE FORMS (CONT.):

- Pressurized dispensers (aerosol sprays):

- Are suspensions of fine solid or liquid particles in gas
- Used to apply respiratory tract and skin

- Several different types of pharmaceutical product may be packaged in pressurized dispensers, known as atomisor or dispensors.

- Surface sprays produce droplets of 100 um diameter or greater.

- May be used as surface disinfectants, wound or burn dressing, relieve irritation of bites.

- Spray-on dusting powders are also available from pressurized containers.

OTHER DOSAGE FORMS:

- Inhaler :

- Inhalers are solutions, suspensions or emulsion of drugs in a mixture of inert propellants held under pressure in an aerosol dispenser.
- Propellant is liquified gas that vaporizes when valves are open
- Release of a dose of the medicament in the form of droplets of 50 um diameter or less from the container through a spring-loaded valve incorporating a metering device. The patient then inhales the released drug through a mouthpiece.
- In some types, the valve is actuated by finger pressure, in other types the valve is actuated by the patient breathing in through the mouthpiece.
- It is commonly used to treat asthma and other respiratory problems.

INTERMEDIATE PRODUCTS USED IN COMPOUNDING:

Extracts: These are concentrated preparations containing the active principals of vegetable or animal drugs which have been extracted with suitable solvents and concentrated to form liquid, soft or dry extract.

Glycerins: These are solutions of medicaments in glycerol with or without the addition of water.

INTERMEDIATE PRODUCTS USED IN COMPOUNDING (CONT.):

Spirits: They are alcoholic or aqueous alcoholic solutions of volatile substances used as flavouring agents.

Tinctures: These are alcoholic preparations containing the active principals of vegetable drugs. They are relatively weak compared to extracts.

Aromatic waters: These are aqueous solutions, usually saturated of volatile oils or other volatile substances. Used as flavoring agents.

SYSTEMS OF MEASUREMENT

WEIGHT AND MEASURES USED IN PHARMACEUTICAL DISPENSING

METROLOGY

- The science that deals with weights and measures called metrology
- Ancient time –

1. human body parts
2. Grains or wheat

- Weight : Weight is a measure of the gravitational force, acting on a body and is directly proportional to its mass.

- Measure: Measure is the measurement of volume of any substance.

- There are two systems of weights and measures:

    1. *The Imperial system*
    2. *The Metric system*

IMPERIAL SYSTEM

It is an old system of weights and measures based on arbitrary and unrelated units like grains, drachms, ounces and gallons.

Measure of weight in imperial system:

Imperial system is divided into two parts for the purpose of measurement of weight as

i) Avoirdupois system

ii) Apothecaries system

AVOIRDUPOIS SYSTEM

- Standard is pound (lb)
- Pound is cylinder –about 1.15 inch in dia

  1.35 inch thick

this cylinder was adopted as imperial standard by weights and measure act 1878

1 lb = weight of cylinder

- All other measures of mass are derived from standard imperial pound

1. 1/16 th part of lb=1 oz (ounce) avoir (1 lb=16 oz)
2. 1/7000 th part of lb= 1 gr (1 lb = 7000 grains)
3. 1 oz = 7000/16 =437.5 gr

APOTHECARY SYSTEMS

- Apothecary system is one of the oldest systems of measurement used in pharmacy prior to the metric system
- Uses fractions, as opposed to decimals.
- Is less accurate than the metric system.
- The system used by an apothecary
- Units of measure include grains, minims, fluidrams, scruples, ounces

THE APOTHECARY SYSTEM

- Originated in Greece
- First system of medication measurement
- One grain = weight of a single grain of wheat [60mg]

- One grain = 60 mg is the ONLY apothecary conversion you will need

APOTHECARIES SYSTEM

In this system "grain" is the standard unit for weight.

Therefore all the measures of mass (weight) are derived from the "grain".

Eg.

20 grains = 1 Scruple'

60 grains = 1 drachm

480 grains. = 1 ounce

8 drachms = 1 ounce

12 ounce = 1 pound

5760 grains = 1 pound

IMPORTANT POINTS

- Grain is same in both the system
- No counterpart in avoirdupois system to scruple of the apothecaries system
- No shortening of drachm to dram
- 1 dram= 27.34375 gr
- 1 drachm=60 gr
- Apothecaries ounce=℥= 1 oz troy
- Avoirdupois ounce= oz
- Apothecaries pound is not used in pharmacy and disregarded

IMPERIAL WEIGHTS

- A) a set of grain weights-

½ grain

1 grain

2 grain

3 grain

4 grains

5 grains

6 grains

they are cut from the metal sheet and denomination stamped on it

IMPERIAL WEIGHT

2. A set of drachm weight comprising-

½ scruple = 10 grains

1 scruple = 20 grains

½ drachm= 30 grains

2 scruple = 40 grains

1 drachm=60 grains

2 drachm-120 grains

this is made up from the brass, in form of flat circular discs or squares

IMPERIAL WEIGHT

- 3. A set of apothecaries or troy ounce weight

Includes

1,2, 3, 4,5 ,8 10 and 20 apothecaries or troy ounce

1 ounce is flat or square shape

Other are cup shape

This set is used when quantities outside the grain or drachm sets are required

IMPERIAL WEIGHT

- 4. a set of avoirdupois weights-

includes

½

1

2

4

8

16 oz

These are flat cylindrical form recessed on upper surface to accommodate the next smaller size

A complete sets forms a cylindrical pyramid

Marked as avoirdupis

ABBREVIATIONS COMMONLY USED IN WEIGHING

Latin name	Symbol	English name	Equal to
Granum	gr	Grain	1 grain
Scrupulus	℈	Scruple	20 grains
Drachma	ʒ	Drachum	60 grains
Uncia oz	℥	Ounce (Avoir)	437.5 grains
Uncia (Troy)	℥	Ounce (Apothe)	480 grains
Libra	lb	Pound (Avoir)	7000 grains
Libra	lb	Pound (Apothe)	5760 grains

IMPORTANT POINT

- g should not be used for grains, may confuse with gram
- The symbol for scruple consist of half circle with line drawn through midpoint
- Drachm symbol resembles fig 3 and is readily distinguished from the symbol for scruple by break its back
- The symbol of apothecaries or tory ounce is made by adding an extra half circle to symbol of drachm
- arabic numerals used with grains, scruple, drachm, ounce are placed before the word

e..g. 6 grains

1 scruple

- Roman numarals used with words are placed after the symbol

e.g. ℈ i = 1 scruple

Half is expressed by letter ss or fs

3 ss= half drachem

Unit 1 is expressed by the letter j

Volume

MEASUREMENT OF CAPACITY IN IMPERIAL SYSTEM

In both Avoirdupois and Apothecaries system, the standard unit for capacity is "gallon".

Therefore all other measures of capacity are derived from gallon.

Eg.

1 gallon = 160 fluid ounces.
1/4 th of a gallon = 1 quart =40 fl.ounce
1/8th of a gallon = 1 pint =20 fl.ounce
1/160th of a gallon = 1 fl. ounce
1/8thofonefl.ounce = 1 fl. drachm
1/60th of one fl.drachm = 1 minim
1 fluid ounce = 480 minims
1 fluid drachm = 60 minims.

Small measure of capacity is pint – made up of glass -conical or cylidrical
Larger measures are from metal

Capacity (ml)	Gratuated in	Numbered at	Back limes at
10	1ml to 10 ml	1,2,4,6,8,10	2,6,8
50	1ml to 10 ml and 5ml to 50 ml	1,3,5, 10, 20 30,40, 50ml	10, 30, 50
100	10 ml to 100 ml	10, 20, 30, 60, 80, 100 ml	20, 60, 100 ml

APOTHECARY SYMBOLS

Volume	
Unit of measure	**Symbol**
minim	♏
fluidrachm	f℥
fluidounce	f ℥
pint	O
quart	qt
gallon	C

ABBREVIATIONS COMMONLY USED IN MEASURES OF CAPACITY

Latin name	Symbol	English name	Equal to
Minimum	M	Minim	1 minim
Fluid drachm	3	fl.drachm	60 minims
Fluid uncial	ʒ	fl.ounce	480 minims
Octarious	O	Pint	20 fl.ounces
Congius	C	Gallon	160 fl.ounces

IMPERIAL QUANTITIES FROM METRIC FORMULAE

- 30 ml for 1 fluid ounce
- 100 ml for 3 fluid ounce
- 120 ml for 4 fluid ounce
- 200 ml for 6 fluid ounce
- 240 ml for 8 fluid ounce

THE METRIC SYSTEM

- The metric system is known for its simplicity. All units of measurement in the metric system are based on decimals—that is, units that increase or decrease by multiples of ten.
- The metric system used exclusively for ordering, measuring, and reporting medications

METRIC SYSTEM

The metric system is used in Indian pharmacopoeia

Measurement of weight in Metric system: In Metric system "Kilogram" is the standard unit for measurement of weight.

Therefore all other measures for weight are derived from kilogram (Kg)

1 Kilogram (Kg) = 1000 grams (g)

1 Hectogram (hg) = 100 grams

1 Decagram (dag) = 10 grams

1 Decigram (dg) 0.1 gram

1 Centigram (cg) = 0.01 gram

1 Milligram (mg) = 0.001 gram

1 Microgram (mcg) 0.000001 gram

1 gram (g) = 1000 mg

0.1 gram 100 mg

0.01 gram = 10 mg

0.001 gram = 1 mg

MEASUREMENT OF CAPACITY IN METRIC SYSTEM

In Metric system, the standard unit for measure is "litre'.

Therefore all measures of capacity are derived from the litre.

Eg. 1 litre (Lt) = 1000 millilitre (ml)

METRIC SYSTEM

- Kg- Kilogram
- L- Liter
- mcg- microgram
- mEq- milliequivalant
- mg- milligram
- mL- milliliter
- mg or mcg- microgram
- µgtt- micro drop
- gm or G-gram

IMPORTANT POINTS

- Use G for gram instead of g in prescription as per SI system but in metric use g for grams
- Use mcg for micrograms

RULES OF METRIC NOTATION

- Unit or abbreviation always follows amount
  - 5 g NOT g 5
- Decimals are used to designate fractional metric units
  - 1.5 mL, NOT $1\frac{1}{2}$ mL

RULES OF METRIC NOTATION

- Use a zero to emphasize decimal point for fractional metric units of less than 1
  - 0.5 mg, NOT .5 mg
  - Will prevent potential dosage error
  - If you misinterpreted medication order as 5 mg instead of 0.5 mg
    - Dosage would be 10 times too much

RULES OF METRIC NOTATION

- Omit unnecessary zeros
  - 1.5 g, NOT 1.50 g
  - This is a critical rule
- When in doubt, double-check
  - Ask writer for clarification

METRIC WEIGHTS FOR DISPENSING BALANCES

- 50, 100, 150, 200, 300, 400, 500 mg and 1,2,3,4,5,10, 15, 20 g
- 1 mg to 50 mg – made up of aluminium, flat and circular handle with forceps
- 2 to 20 g are of brass- flat and circular
- 50, 100, 200, 500, 1000 g –are cylindrical and popular large , easy handle knob at the top

METRIC CONVERSIONS

- Kg, g, mg, mcg
- Lbs. to Kg
- L to mL

KG, G, MG, MCG

- To convert if going from large value to smaller value, move the decimal point 3 places to the right for each conversion.
- If going from smaller value to larger value, move the decimal point 3 places to the left for each conversion.
- 3.0 Kg = 3000. g = 3000 g
- 3.0 Kg = 3000000. = 3,000,000 mg
- 3.0 Kg = 30000000 00. =
- 3,000,000,000 mcg

L TO ML

- 1 L = 1000. = 1,000 mL
- 500 mL = 500. =0.5 L

CONVERSIONS TO MG

- 6 Kg = 6,000,000 mg
- 14 g = 14,000 mg
- 1,000 mcg = 1 mg

CONVERSIONS TO MCG

- 1 g = 1,000,000 mcg

CONVERSIONS TO G

- 0.043 Kg = 43 g
- 100,000 mcg =0.1 g
- 1,000 mg = 1 g
- 0.075 mg =0.000075 g
- 1,500 mcg = 0 .001500 g
- 1 Kg = 1,000 g

CONVERSIONS TO KG

- 1000 g = 1 Kg
- 1,500 mg = 0.0015 Kg
- 0.042 mg = 0.000000042 Kg
- 720,000,000 mcg = 0 .72 Kg

LBS. TO KG

- There are two methods that may be used to convert pounds to Kg:
- Lbs./ 2.2 = Kg
- Therefore, if you need to convert Kg to Lbs:
- Kg x 2.2 = Lbs.

LBS. TO KG

- 275 Lbs. = 125 Kg
- 100 Lbs. = 45 Kg

KG TO LBS.

- 100 Kg = 220 Lbs.
- 32 Kg = 70 Lbs.

ML TO L

- 3,000 mL = 3 L
- 1,500 mL = 1.5 L
- 500 mL = 0.5 L

INTERCONVERSIONS OF IMPERIAL AND METRIC UNITS

Weight measures

1 grain = 64.8 mg =65 mg (60 mg) (for all practical purposes.)

1 gram = 15.43 gr = 15 gr

1milligram (mg) = 1/65 gr or 1/60 gr

1 kilogram = 2.2 lb (pounds)

Capacity measures

1 drop = 1minim = 0.06 ml (for all practical purposes)
1 fl.ounce =29.57m1 =30m1
1 millilitre (ml) = 16.23 minims = 15 minims
1 litre = 33.1 fi. ounce
1 fl. drachm = 4 ml
1 fl.ounce =3Oml
1 ml = 15 minims
0.06 ml = 1 minim
500m1 = 1 pint
l000ml = 1quart

HOUSEHOLD SYSTEM OF MEASUREMENT

- Household measures are not accurate enough to be used in calculation of drug dosages.
- However, when sending patients home with liquid medications, it is sometimes necessary.
- Advise patients to use the measuring device provided with their prescription or an accurate measuring spoon [not normal tableware]

UNITS USES IN HOUSEHOLD MEASUREMENT

- Drop (gtt)
- Teaspoon (t)
- Tablespoon (T)
- Ounce (oz)
- Cup (cup)
- Pint (pt)
- Quart (qt)
- Pound (lb)

HOUSEHOLD MEASURE: VOLUME

Measurement Unit	Equivalent within System	Metric Equivalent
1 tsp (teaspoonful)		5 mL
1 tbsp (tablespoonful)	3 tsp	15 mL
1 fl oz (fluid ounce)	2 tbsp	30 mL (29.57 mL)*
1 cup	8 fl oz	240 mL
1 pt (pint)	2 cups	480 mL*
1 qt (quart)	2 pt	960 mL
1 gal (gallon)	4 qt	3840 mL

* In reality, 1 fl oz (household measure) contains less than 30 mL; however, 30 mL is usually used. When packaging a pint, companies will typically present 473 mL, rather than the full 480 mL, thus saving money over time.

Domestic measures

1 drop = 1 minim = = 0.06 ml

1 teaspoonful = 1 fl. Drachm = 4 ml (5 ml for all practical purposes)

1 desertspoonful =2 fl.Drachm= 8 ml (10 ml for all practical purposes)

1 tablespoonful =4 fl. Drachm=16 ml (15 ml for all practical purposes)

2 tablespoonful=8 fl. Drachm=32 ml (30 ml for all practical purposes)

1 wine glassful=2 fl. Ounce=60 ml

1 teacupful=4 fl. Ounce=120 ml

1 tumblerful=8 fl. Ounce=240 ml

Table 5.7

HOUSEHOLD MEASURE: WEIGHT

Measurement Unit	Equivalent within System	Metric Equivalent
1 oz (ounce)		30 g
1 lb (pound)	16 oz	454 g
2.2 lb		1 kg