KIND OF DRUGS

There are different types of drugs according to their use and effects. Some are grouped according to their medical use and also for the treatment purposes. They can further be divided as per their effects on body and mind. Drugs have similar impacts and risks.

Various types of drugs are:

1. Antibiotics
    a. We have huge class of antibiotics depending upon their effects on the type of infection and their causative agents, they stop the growth and kill the microorganisms. E.g. Azithromycin, Cefadroxil, Ofloxacin

2. Analgesic and anti-inflammatory drugs
    a. These are grouped as opioid drugs which are used to treat patients' pain and inflammation

3. Antipyretics
    a. These are used to cure fever

4. Antiseptic and disinfectants
    a. Antiseptics are the drugs used to kill the microorganisms on the surface of the skin of the living beings. E.g.Dettol, Amalgam,turmeric.
    b. Disinfectants are those are used to kill the microorganisms on the dead surfaces. E.g.lyzol,phenyl

5. Anti-helminthic
    a. Drugs which are used for deworming are called as anti-helminthic e.g. albendazole

6. Antidiabetic drugs
    a. These are the drugs prescribed for diabetic patients e.g. metformin
7. Diuretics
    a. Drugs which are used to control the rate of flow of urine are known as diuretics e.g. frusemide

8. Anaesthesia drugs
    a. The drugs prescribed for the loss of consciousness of the patient. They are of two types
    b. General anaesthesiagiven for the unconsciousness of the whole body of the patient. E.g. chloroform
    c. Local anaesthesia are the drugs given to make any local area of the body unconscious e.g. Xylocaine

9. Hypertensive drugs
    a. These are the drugs given to control the high blood pressure which is also called as tension.Tension is mainly of two types
    b. Where the cause is known and is called as primary tension
    c. Where the cause is not known and is called as secondary tension.

10. Multivitamins
    a. These are given as dietary supplements to main the nutrient level of the body.

11. Alkaloids
    a. These are nitrogenous plants. They are insoluble in water and are soluble in Alcohol,they combine with acids to form water soluble saltse.g. morphine, Atropine, Nicotine.

12. Essential oils
    a. Natural oils obtained by distillation and having characteristics odour of plant or other sources from which they are extracted. E.g. lavender, rose

13. Fixed oils
    a. A natural vegetable or animal oil that is non volatile. E.g. linseed oil

14. Glycosides
    a. Compounds formed from simple dyes and others by replacement of hydroxyl group in the sugar molecule. Many drugs and poisons are derived from plants are glycosides.

15. Waxes
    a. These are esters of fatty acids. Wax can be obtained from plants and animal origin. E.g bee wax

16. Resins
    a. These are those substances which are used in different medicines.The oxidation of volatile oils result in solid,dry substances knowns as resins. They are soluble in Alcohol and insoluble in water.

CHARACTERISTICS OF DRUGS

The drugs to be prescribed to the patients should have the following characteristics:

1. It should be non-toxic, bio-compatible, biodegradable and physio chemical stable *in-vivo* and *in-vitro* and should have no side effects.
2. Restrict drug distribution to target cells or tissues or organs and should have uniform capillary distribution.
3. Controllable and predict the rate of drug release.
4. Drug release should not affect the drug action.
5. There should be therapeutic amount of drug release.
6. Minimal drug leakage during transit.
7. Carriers used must be Biodegradable or readily eliminated from the body without any problem and no carrier induced modulation of diseased state.
8. The preparation of the delivery system should be easy or reasonably simple reproductive and cost effective.
9. The drug should be easily eliminated from the body by simple metabolic processes after its action.
10. The drug should not get accumulated in any of the tissues or cells of the body causing inflammation.

PHARMACEUTICAL PROCESS

Pharmaceutical Process: The different processers which are involved in the process of manufacturing any form of drug.

The process involved are:

1. Mixing and homogenization
2. Separation
3. Filtration
4. Distillation

Some other processes involved after the preparation are *heat processes* and include the following:

1. Evaporation
2. Sublimation
3. Fusion
4. Desiccation
5. Calcination
6. Ignition
7. Drying

Mixing and Homogenisation:

It is a process in which two or more than two components are roughly mixed in such a way that each particle of any one ingredient lies very near as possible as to the other ingredient of the other component

Objective of mixing:

Mixing is done to obtain following type of products:

- When two or more miscileliquid are mix together a solution is prepared is known as true solution.
- When two miscible liquid are mixed in presence of imulsifing is agent is emultion is formed.
- When any solid is dissolved in a vehicle solution is obtain.
- When any in soluble material is added in a vehicle is suspended is formed.
- When a solid or liquid is mixed with a semi solid based an ointment is formed.
- When two or more solid substance are mixed together a power is obtained. Which when filled in a shell capsule is formed and then powders. When compressed Tablet is formed.

Mixtures are classified based on:

Type of mixing:

1. Positive mixing: The mixtures are formed when two or more then to gases or miscible liquid are mixed by means of diffusion.

2. Negative mixing: This type of mixture are formed when in soluble solid are mixed with vehicle to form suspension mixed to formed emulsion these are more difficult to prepare and require external force for mixing.

3. Neutral mixing: Product like paste ointment and mixed powder and example of neutral mixture.

Mechanism:

In all type of mixture, mixing is achieved by applying one or more of the following mechanism.

1. Convective: During this mixing transfer of group of particles in bulk takes place.
2. Shear mixing: During this mixing shear forces are created with in the mass of the material by using agitatoriun arm of blast of air.
3. Diffusive mixing: During this mixing the material are tilted so that the gravitational force poses upper layer to slip diffusion of material takes place.

Rate of mixing:

Mixing of achieving uniform randomness which on subdivision to indivisual dose contains the correct preparation or proportion of each component which depend on amount of mixing done.

Homogenization:

Homogenization is a process in which emulsion is converted into colloidal state of uniform composition by reducing particle size so that each mattered dose should have same composition.

This process is used for the preparation of emulsion, suspension.

Different types of machines are used for homogenization which are as follows:

Homogenizer:

These are based on the principle that when a large globule of emulsion is passed under pressure through a narrow orifice the large globule is broken into smaller globules having stability and uniformity.
Different types of homogenizers used are:

1. Hand homogenizer
2. Kenwood homogenizer
3. Silverson homogenizer

4. Colloid mills homogenizer
5. Ultrasonic emulsifier

Separation:

Separation is a technique used to separate unwanted substance from the required ones.

Different technique used for separation are:

1. Filtration: In this technique we can separate solid preparation in this method dissolved they substance in water or any liquid in which it gets dissolved, filterate, residue will contain unwanted substance and filtrate contain wanted substance. Remove the residue and evaporate the filtrate.
2. Physical separation: By this method we can separate to or more than to substance out of which one is water soluble. Mix them in water, residue will contain one substance and filtrate the other. Evaporate the filtrate and get the desired product rub the residue with magnet and separate the other.

Heat process:

Evaporation:

Evaporation may be defined as removal of liquid from the surface of liquid below its boiling point. It is a slow process which can take place at room temprature . Evaporationtake place at any temprature but the liquid boiles at its on boiling point.

Application of evaporation:

It is the important process in the one of important process in the manufacturing of pharmaceutical product.

It is used in the preparation of the liquid extract, in case of concentration of blood serum and it is used in the manufacture of drug containing antibiotics.

Sublimation:

It is a process in which the solid on heating gets converted into vapor.The vapor's on condensation are converted back to the original state.

Application:

This process is used in the manufacturing of iodine, ammonia, ammonia chloride and napthaline.

Dessication:

It is a process of removing moisture from liquid or solid substance. The commonly used drying agent include concentrated sulfuric acid, phosphorus penta-oxide, calcium chloride and silica gel. The drug to be dried in taken in a china dish and is kept inside the desiccators above the surface of drying agent. The substance which are very sensitive to moisture are formed as tablet or capsule which are further sealed in voils. On the bottom of which a small cloth beg is field with silica gel which acts as desiccant.

Application:

- Desiccation help in preventing the vegetable and animal drug which gets destroyed by moisture.
- It reduces the bulk and weight of the substance due to the loss of moisture and become easy to handle.
- Stability of drug increased.
- Drug when wet can not be easily converted into dose form so it helps them to be powdered.

Calcination:

It is the process in which the substances are heated to remove the volatile contain and a fixed amount of drug. In the formed of residue is obtained. In laboratories this process is done in a silica or platinum crucible and in industries in metallic vessels. It is used in the preparation of calcium oxide, light and heavy magnesium oxide, zinc and red mercuric oxide. The substances are prepared by heating and this method is also used in lab in gravimetric analysis .

Distillation:

It is the process by which separation of liquid is done.It can be carried out for one or more than one liquid or for a single liquid.AddKM_NO_4,calcium chloride and magnesium ribbon in the round bottom flask and keep the solution for 72 hours.Boil the round bottom flask in a heating mantle.Fit the round bottom flask with a thermometer jacket and delivery tube with a condenser.As the temperature rises and the colour of the solution changes from pink to colourless it starts to evaporateand the fumes or drops condense and are collected.At a particular temperature, collect the solution and discard the last portion of the solution.Note down the temperature and verify with the data.

Frictional Distillation:

When a mixture of two or more than two unknown liquidsare to be separated.

To the solution add KM_NO_4, magnesium ribbon and calcium chloride and leave it for 72 hrs.Boil the container in a heating mantle till the colour changes from pink to colour less. To this attach a thermometer jacket and a condenser fitted with a delivery tube. As a temperature rises the droplets of the solution gets condensed and start collecting. Collect the solution and mark it as A. Further as the temperature rises, the fumes and or droplets are condense and collect. Collect the liquid and mark as B. Repeat the same procedure to the last portion of the liquid and mark it C.

Discard few millilitres in between A to B and B to C. Further leave the last segment C. Because of interference of the liquids.

Ignition:

This is the process by which an organic substance is strongly heated until hole of material is burnt and an in organic residue is left behind.

Fusion:

It is a process of combining two or more things together to form a bigger molecule. It is also defined as the process of merging atoms together to create energy.

Chromatography:

It is the technique used for the separation of two or more liquid solutions by the phenomenon of travelling of constituents of mixture at different speeds leading to separation. It is of following types:

1. Thin layer chromatography
2. Paper chromatography
3. Gas chromatography.

Out of these, thin layer chromatography and paper chromatography are used on a larger scale.

HANDLING OF PRESCRIPTION

The handling of prescription involves the following stages:

1. Receiving.
2. Reading and checking.
3. Collecting the material.
4. Compounding.
5. Finishing.

Receiving:
The prescription should be received from the patient by the pharmacist only. Under no circumstances, the prescription be handled by an unauthorized person.

Reading and checking:
A brief examination of each prescription should be immediately done after it is received. This will help the pharmacist about the drug and the nature of dosage to be given to the patient. Sometimes, the information related to name, age, sex and address of the patient may not be mentioned on the prescription. Therefore, the same must be recorded on the prescription. Every prescription should be read and understood completely before compounding its abbreviations and words must be interpreted correctly. Never guess about the meaning of any word. It may lead to serious consequences. If there is any doubt, one must consult the fellow pharmacists.

Collecting the material:
Thematerial of the prescription should be collected on the left-hand side.

Compounding:
This is the most important phase in handling the prescription. In this way, a proper drug is dispensed in a suitable form. It must be noted that only one prescription should be handled at one time. Handling of two or more prescriptions by a pharmacist may be a risky affair.

Finishing:
The compounded medicine should be filled into a suitable contained depending upon the nature and quantity of drug to be dispensed. The various type of containers used in pharmacy includes bottle for liquids, wide mouth bottles for filling liquids, large quantity of tablets, capsules and bulk powder. Ointment jar or collapsible tubes for filling ointment cream and semi solid dosage

form. Before the prescription is handed over to the patient, the container should be completely checked and verified.

WEIGHTS AND MEASURE

Before discussing any calculations, which are involved in dispersing of a drug/s, it is necessary to have complete knowledge of weight and measure.

In medicine, precise measurements are necessary—for example, when various substances are measured in laboratory tests to evaluate health or make a diagnosis. Different units of measure may be used depending on the substance. Usually, the metric system, based on multiples of 10, is used to measure the following:

- **Mass:** Grams measure mass, the amount of matter in an object. Mass is similar to weight, but weight is affected by gravity.
- **Volume:** Liters measure volume, the amount of space an object occupies.
- **Length:** Meters measure length.

Prefixes, indicating which multiple of 10 is meant, can be attached to the basic unit, such as meter (m), liter (L), or gram (g). Using prefixes helps make a number more readable. Commonly used prefixes include kilo (k), deci (d), centi (c), milli (m), and micro (μ).

Other units measure different properties of a substance. For example, a mole (mol) is the amount of a substance that contains the same number of particles (molecules or ions) that is in 12 grams of carbon. Thus, regardless of the substance, 1 mole always contains the same number of particles. However, the number of grams in 1 mole varies greatly from substance to substance. One mole equals the molecular (atomic) weight of a substance in grams. For example, the molecular weight of sodium is 23, so 1 mole of sodium equals 23 grams. A molecule of table salt (sodium chloride) consists of one atom of sodium and one atom of chlorine (which has a molecular weight of 35 grams). Thus, one mole of sodium chloride weighs 23 grams + 35 grams = 58 grams.

Osmolarity is a measure of the number of particles in a liter of liquid, and osmolality is a measure of the number of particles in a kilogram (kg) of liquid. Because 1 liter of water weighs 1 kg, osmolarity and osmolality are the same for substances dissolved in water.

An osmole is the amount of a substance that dissolves in liquid to form 1 mole. For example, because table salt dissolves into sodium and chloride in water, one mole of table salt dissolved in 1 liter of water results in 1 mole of sodium and 1 mole of chloride. Thus, its osmolarity is 2 osmoles per liter, and its osmolality is 2 osmoles per kg.

Equivalents (Eq) and milliequivalents (mEq) measure a substance's ability to combine with another substance. A milliequivalent is roughly equivalent to a milliosmole.

Formulas are used to convert a measurement from one unit to another. The same amount can be expressed in terms of different units. For example, the concentration of calcium in the blood is normally about 10 milligrams in a deciliter (mg/dL), 2.5 millimoles in a liter (mmol/L), or 5 milliequivalents in a liter (mEq/L).

The units used for medical tests vary depending on the substance being measured. The units that are traditionally used in the United States are called conventional units. Conventional units usually express concentration as weight per volume, and the volume can vary. The International System of Units (SI units) always expresses concentration as moles per liter.

To have a basic understanding of various system of units, some universal calculations are shown below:

Length

1 millimeter = 1/1,000 meter

1 centimeter = 1/100 meter

1 decimeter = 1/10 meter

1 meter (basic unit of length)

1 dekameter = 10 meters

1 kilometer = 1,000 meters

Volume and Capacity (Liquid and Dry)

1 cubic centimeter = 1/1,000,000 cubic meter

1 cubic decimeter = 1/1,000 cubic meter

1 cubic meter = 1 stere (basic unit of volume)

1 milliliter = 1/1,000 liter = 1 cubic centimeter

1 centiliter = 1/100 liter

1 deciliter = 1/10 liter

1 liter = 1 cubic decimeter (basic unit of capacity)

1 dekaliter = 10 liters

1 hectoliter = 100 liters = 1/10 cubic meter

Weight (Mass)

1 milligram = 1/1,000,000 kilogram = 1/1,000 gram

1 centigram = 1/100,000 kilogram = 1/100 gram

1 decigram = 1/10,000 kilogram = 1/10 gram

1 gram = 1/1,000 kilogram

1 dekagram = 1/100 kilogram = 10 grams

1 hectogram = 1/10 kilogram = 100 grams

1 kilogram (basic unit of weight or mass)

1 metric ton = 1,000 kilograms

POSOLOGY OF DRUGS

Poso: How much

Logy: Science (Study of how long)

Posology: Posology is a Greek word where "posos" means How much and "Logy" means Science. This means, it is the branch of science which deals with the study of dosage or quantity of drugs, which can be given to produce the required action. The dosage of drugs cannot be fixed because there are so many factors which influences the dose.

Example: Age condition of the patient, severity of the diseases, natural tolerance, acquired tolerance, routes of administration, degree of absorption and rate of elimination.

The factors of posology are: age, sex, weight and, surface area.

1. **Age:** The doseproportionate to age can be calculated as the dosage for a child from adult dose can be calculated by anyone of the following formula.

   (A) Young Rule: Child dose = { (age in years)/(age in years +12)}* Adult dose.
   e.g. = Let the age of child = 10 years
   Adult dose = 60 ml.
   Child dose = (10/10+12)*60 = 27.2 mg

   (B) Dilling Rule: Child dose = (age in years/20)*adult dose
   e.g. = Let the age of child = 8 years
   Adult dose = 60 mg.
   Child dose = (8/20)*60 = 24 mg

   (C) Clock Rule: According to weight
   Child dose = (Child Weight in Kg.) / (70) *adult dose
   e.g. = Let the weight of child = 14 kg.
   Adult dose = 60 mg.
   Child dose = (14/70)*60 = 12 mg.
2. **Weight:** The weight of body normally recommendedis based on normal body weight of 70 kg. But such a dose will be too less for a muscular person weighing 100 kg and too large for a weak person weighing 50 kg.
3. **Sex:** Generally, females require less dose than males because of their less weight and also due to the fact that they are more responsible to the effect of certain drugs. Drugs should be given very carefully during menstruation, pregnancy and lactation. Drugs like alcohol and anaesthetic gases barbiturates narcotic and non narcotic analgesics, which are easily transported from mother to the foetus should be avoided.
4. **Surface Area:** The calculation of child dose according to surface area is more appropriate rather than the method based on age. This method is based on the following formula:

{(Surface area of child) *100 / (Surface area of adult} * % of Adult dose.

S.No.	Age	% of Adult Dose
1	One month	10%
2	2 month	15%
3	4 month	20%
4	1 year	25%
5	3 year	35%
6	5 year	40%
7	10 year	60%
8	12 year	75%
9	16 year	90%

Factors Effecting Dose and Action of Drugs: Various factors which influences the dose section of a drug in an individual are:

1 Age
2 Weight
3 Sex
4 Surface Area
5 Route of drugs
6 Time of drugs
7 Environmentalfactor
8 Emotional factors
9 Synergism
10 Habit
11 Addition
12 Hypersensitivity
13 Tolerance

Route of Drugs: The dose of given drug may very according to the dosage form and route of administration. Drugs given by route entre the drugs easily and directly .So less dosage is required which is less than the oral dose.

Time of Drugs: Time of administration of drug is very important. Drug are rapidly absorbed from the empty stomach so the amount of drug taken before meal is effective then the one taken after the meal is ineffective.

Environmental factor: Female are more emotional and responsible to drug. Therefore, require less dose of drug.

Synergism: When two or more drug are used in combined from their action is either increased depending upon the nature of drug to be combined

Hypersensitivity: It is an allergic reaction to a drug and is different from the expected result.

Habit: When repeated use of drugs all agents production of emotional or psychological.

COMMON DRUGS AND THEIR DOSAGES

Following is the list of commonly used drugs and their dosages.

S.No.	Drug	Dosage
1	Acetylsalicylic Acid , Aspirin	4 chewable baby aspirin (81 mg each) PO
2	Ativan(Lorazepam)	Adult 0.5-2.0mgIV/IO/IM. Pediatric 0.1mg/kgIV/IO/IM.
3	Dexamethasone(Decadron)	*Adult(>40):* 10mg IV, IO, IM,PO. *Pediatric (<40):* 0.3mg/kg, up to 10 mg, IV, IO, IM,PO.
4	Dextrose 50%	*Adult:* 25 gm IV/IO *Child:* 25-50 lbs – 12.5 gm (25.0 ml D50 mixed with 25.0ml NaCl) < 25 lbs – 6.25 gm (12.5 ml D50 mixed with 37.5 ml NaCl) Repeat one dose in 2 minutes if the GCS is 12.
5	Dextrose (Oral)	Give patient oral glucose or sugared juice, honey, molasses, Kayro syrup, etc.… if patient awake.
6	Diphenhydramine HCL, Benadryl	Adults 25 to 50 mg slow IV/IO or deepIM Pediatric 1 mg/kg IM/IV/IO, not to exceed 50mg
7	Duoneb (Albuterol/Atrovent mix)	Adults: 3 ml vial Duoneb(2.5 mg Albuterol / 0.5 mg Atrovent) in nebulizer. Children: Same as adults
8	Epinephrine 1:10,000, (Adrenalin)	Cardiac ACLS: *Adults:* 1 mg (10 ml) IV/IO. Repeat every 3-5 minutes until pulse returns. *Children:* 0.01 mg/kg (0.1 ml/kg) IV/IO. Repeat every 3-5 minutes until pulse returns or bradycardia resolves.
9	Furosemide, (Lasix)	*Adults:* 40 mg (4 ml) IVIO at 15-20 mg/min. Double the dose (80 mg) for patients taking PO Lasix daily. *Children:* 1 mg/kg (0.1 ml/kg) IV/IO at 15-20 mg./min.
10	Lidocaine HCL, (Xylocaine)	*Adults:* Cardiac arrestVF/VT 1.5 mg/kg IV/IO or 3 mg/kg ET (one dose only). Repeat IV in 5 minutes, if unsuccessful, to a max of 3 mg/kg. *Adults:* Wide QRSTachycardia 1.5 mg/kg IV/IO at 50 mg/min. or 3 mg/kg ET. Subsequent IV doses: Administer 0.75 mg/kg at 50 mg/min. every 5 min. up to 2 doses (3 mg/kg total). Avoid additional doses in CHF, shock, liver failure, and age > 70 yrs.

		Children: Cardiac arrest VF/VT 1.0 mg/kg IV/IO or 2 mg/kg ET (one dose only). Repeat IV dose every 5 minutes, if unsuccessful, to a max of 3 mg/kg. *Children:* Wide QRS Tachycardia 1.0 mg/kg IV over 1 minute or 2 mg/kg ET. Subsequent IV doses: Administer 1.0 mg/kg over 1 minute every 5 min. upto a max of 3 mg/kg. Avoid additional doses in CHF, shock, and liverfailure. *Adults:* ConsciousIO 0.5 mg/kg IO; 30 – 60 seconds for full effect; Not to exceed 50 mg.
11	LIDOCAINE HCL (PRE-MIX)	As a drip to suppress return of V-Fib or V-Tach, Use pump or Micro- drip Soluset to administer at starting rate of 1 mg/min. May increase dosage to 2, 3, or 4 mg/min. as break-thru ectopy occurs.
12	Midazolam HCL, (Versed)	Seizures Adult: 2 – 10 mg IV/IO or 5 – 15 mg IM Pediatric - 0.2 mg/kg – max 5 mg IM 0.05 – 0.1 mg/kg IV/IO; max 2.5 mg; may repeat to 5 mg for Sz. Lasting more than 5 min.
13	Morphine Sulfate	IM dose 5 mg – 10 mg may repeat as needed IV/IO at 2 - 5 mg Repeat IV/IO dose after 5 min., as needed to max dose of 10 mg. (may give up to 20 mg for burn patients)
14	Nitroglycerin, Nitrostat	Tablet: 0.4 mgSL. Spray (each squirt = 0.4 mg)Sublingual May be repeated every 5 minutes unless the systolic BP is < 100.
15	Oxytocin (Pitocin)	IM: 10 USP units.
16	Phenergan (Promethazine)	12.5 mg – 25 mg IV/IO/IM (on average adult) 6.25 mg Adults > 60.
17	Sodium Bicarbonate, $NaHCO_3$	*Adults and Pediatrics:* 1 m Eq/kg IV/IO (1 ml/kg). and then 0.5 mEq/kg or 1 amp until pulse is restored
18	Vasopressin	Adults: 40 units IV/IO Peds: Not indicated for pediatrics
19	Zofran (Ondansetron HCL)	Adult: 4 mg IM or slow IV/IO (Over 2 min) 4 mg Tablet placed in mouth of conscious patient. Repeat 4 mg dose in 15 minutes if no relief from firstdose Pediatric: < 2 years – 2 mg IM/IV/IO

		> 2 years – 4 mg IM/IV/IO

LOTION

These are liquid suspension or dispersion ment for the external application to the skin.

They are directly applied to the skin without rubbing on friction.

Lotion may be used for local cooling or soothing or protective purpose.

They contain alcohol & glycerin to keep the skin moist for longer time.

They should be dispensed in a colouredwater.

The container should be labeled for external use and shake the bottle well before use clearly.

Preparation Requirement

- Calamine – 15 gm
- Sodium citrate-0.5 gm
- Bentonite-3gm
- Liquid phenol-5ml
- Glycerine-5ml
- Rose water-Q

Procedure

Mix the weighed amount of calamine, zinc oxide,bentonite in a pestle mortar,Triturate it, to this addasolution of sodium citrateadd about 70 ml rose water. Add the required quantity of liquid phenol and glycerineand mix well.

To this add more water to produce the required volume, mix well so as to get a uniform preparation. Transfer it to a bottle, cork it, label and dispense.

USES

1. It is used as an astringent.
2. It protects from sun burn.
3. It acts as a soothing agent which gives relief from Itching and pain during skin irritation.
4. It is used in ring worm infection and eczema.

SUPPOSITORIES:

These are long elongated tablet form of drugs, which are used for the medication for inserting into the body cavity such as, rectum, vaginal, urethra. When inserted, they melt and dissolve in the cavity fluid. They are generally prepared in 1-2 grams.

Uses:
They are used for**:**

1. To produce local action.
2. To produce systematic action.
3. For the case of constipation, irritation and, haemorrhoids.

Types:
They are divided intofollowing types of Suppositories:

- Nasal
- Rectal
- Vaginal
- Urethral
- Ear

Nasal:
These are used in nasal cavities and are similar in shape as urethral suppositories. The weight is about 1 gm. and the length is 9-10 cm. They are always prepared by gycerogelatin base.

Rectal:
These are used for rectal infections. They are tapered from one side or from both the sides and have weight of about 2 gms.

Vaginal:
These are formed for vaginal fungal infections. They are larger than rectal suppositories. They may vary in weight from 3-6 gms or more. They may be conical or rod shaped.

Urethral:
They are meant for urethral application of drugs. They are long elongated or cylindrical in shape. They are rounded at one end. They vary in weight (2-4 gms) and the length varies from 2-5 inches.

Ear:
Normally oils are used as a base and cut according to the requirement.

OINTMENTS

Ointments are soft, semi solid preparations meant for external application on the skin or mucous membrane.

They are used for their emollient and protective actions to the skin.

The absorption of medicament by the tissues from the ointments or other semi-solid preparations depend upon a number of factors, such as properties of drugs incorporated, properties of base used, condition of the patient skin, site of application, duration of application and degree of friction used in application the preparation.

Characteristics of an Ointment:

1. It should be physically and chemically stable.
2. It should be smooth.
3. It should melt or get soft at body temperature and can be easily applied.
4. The base should be non-irritating.
5. The medicaments should be finally divided and uniformly distributed throughout the base.

Classification of ointments:
On the basis of penetration power:

Ointment can be classified according to their properties based on their penetration are as:

Epidermic:

- These ointments are used to produce their action on the surface on the skin to produce local action.
- They are not absorbed
- These types of ointments act as protective, antiseptic and parasiticide.

Endodermic:

- These ointments are used to release medicaments that penetrate in to the skin.
- They are partially absorbed and act as emollients, stimulants and local irritants.

Diadermic:

- These ointments are used to release the medicament that pass through the skin to produce systemic effect.

On the basis of use:

Antibiotic:
These ointments are used to kill the micro organism. The agent used are Bacitracin, Chlor-tetracycline Neomycin.

Anti-enzymatous:
These ointments are used to remove oozing and excretion from vesicles on the skin. The drug used are hydrocortisone, Coal-tar and Salicylic acid.

Anti-fungal:
These ointments are used to inhibit or kill the fungi. The agents used are Benzoic acid, Salicylic acid and Nystatin.

Anti-Inflammatory:
These ointments are used to relieve inflammation, allergic and pruritic condition of the skin. The agents used are betamethasone, hydrocortisone.

Anti-pruritic:
These ointments are used to relieve itching. Drugs used for this purpose include benzocaine and coal-tar.

Astringent:
These ointments cause contraction of the skin and decrease discharge. Example of astringents include calamine, zinc oxide, aluminum acetate, acetic acid and tannic acid.

For Dandruff:
The drugs used are salicylic acid and cetrimide.

As Emollient:
These are the ointment which are used make the skin soft. The agent used are soft paraffin, cold cream and water in oil emulsion.

Keratolytic and keratoplastic:
Ointments are used to remove or make hard skin soft. The agents include resorcinol, salicylic acid, Sulphur. Keratoplastic substance tend to increase the thick ness of the horny layer.

Parasitic:
These ointments destroy or inhibit living infestations such as lice and ticks. The agents include in the ointments or cream or lotion are Benzyl-benzoate and Sulphur.

Protectant:
These ointments protect the skin from moisture, air, radiations and chemicals. The agents include silicon, petroleum, calamine, Zinc oxide and titanium dioxide.

COATING

Coating is the process by which the outer layer of the coating material is applied on the surface of the dosage forms in order to give benefits over the uncoated drugs. The benefit of this process is that it delivers to the substrate enhanced aestheticand physical properties derived from the coating material.

Tablet coating is one of the examples of coating. This process is of different types:

1. Sugar coating tablets
2. Film coating
3. Enteric coating
4. Gelatine coating

The purpose of coating the tablets is taste, odour masking. It also protects the physical and chemical nature of the drugs. It also protects the drug in the stomach and controls the release of active form of drug. Coating is also applied to many oral drugs such as particles, powders, granules, crystals and pellets.

Coating also protects the process of corrosion by preventing the drugs to their exposure to moisture and air. The material used for coating are metallic, organic,inorganic, polyester, polyurethane and plastics.

INFUSIONS

These are the drugs whichare administered by intravenous (I.V) route or by the route other than oral such as I.Meidural route i.e. into the membranes or epidural.

Some examples of infusion therapies are:

- Antibiotics / Antivirals
- Anticoagulation therapy
- Antihemophilic factors
- Chemotherapy
- Enteral Nutrition
- Hydration

The infusions given by I.V. route are the fastest way to deliver medications and fluids replacements throughout the body. They may be used for the correction of electrolyte imbalances in the body. they are used to deliver medicines and also for blood transfusions in the body.

Infusions aregiven to the patients for following conditions:

1. Whose condition is severe where they cannot be given oral drugs.
2. Infections which do not respond to oral drugs.
3. Dehydration
4. Cancer patient and their related health problems.
5. Gastro intestinal disease
6. Immune deficiencies
7. Rheumatoid Arthritis
8. Psoriasis
9. Asthma
10. Allergies
11. Gout

SOLUTION

Solutions are the homogeneous Mixtures prepared by dissolving solid, liquid or gases in another liquids. These are the preparations in which salutes are dissolved in solvent. Salutes are the substances which are to be added to the solvent and are in small quantities whereas solvents are in the higher ratio.

Types of solutions

There are mainly nine types of solutions:

1. Solid in solid e.g salt and turmeric powder
2. Liquid in solid e.g ice cubes
3. Gas in solid e.g camphor
4. Liquid in liquid e.g alcohol and water
5. Solid in liquid e.g salt in water
6. Gas in liquid e.g carbonated beverages
7. Solid in gas e.g Particulates in air
8. Liquid in gas water vapour
9. Gas in gas e.g atmosphere, blanket of gases

The most common solvents used in solutions are

1. Water
2. Alcohol, ethanol
3. Glycerine
4. Acetone
5. Chloroform

Methods of preparations of solutions

It involves the preparation of saline solution i.e. 0.9% sodium chloride solution (NaCl).

Saline solution is a mixture of salt and water. It contains 0.9 % of common salt (NaCl) which is similar to sodium concentration in blood and tears.

These solutions are used as mouth wash, to be Infused in patients' body so we should take care mouth the apparatus to beused should be thoroughly clean.

To make 1000ml of solution salad to store it at room temperature and kept for 03 months following procedure is to be used.

Procedure

Dissolve 9 grams of sodium chloride (NaCl)having molecularweight of about 55.48 grams in 700 ml of distilled water in a clean container. To this add water so as to raise the volume of solution to 1000 ml. Make p10 ml portion from the whole in a sterile 15ml culture tubes.

If the solution is to be used immediately itis necessary to sterile the solution. If it is to be kept for long term storage sterilize it in autoclave for 15 minutes at 121 degree centigrade or pass it through 0.45- or 0.22-micron sterile filters.

USES

They are used in common health care for the treatment of dehydration,flush wounds, to administer diluted medications and sustain patientsthrough surgery and dialysis.

DRESSING & BANDAGE

DRESSING

A dressing is a sterile cotton pad or compress applied to a wound to promote healing and protect the wound from further harm.

A dressing is designed to be in direct contact with the wound, as distinguished from a bandage, which is most often used to hold a dressing in place.

Aim

1. To promote wound granulation and healing
2. To prevent infection
3. To apply medication to the wound
4. To provide comfort
5. To decrease purulent discharge from the wound

Types

1. **Adhesive dressing:** An adhesive bandage is a small, flexible sheet of material which is sticky on one side, with a smaller, non-sticky, absorbent pad stuck to the sticky side. The pad is placed against the wound, and overlapping edges of the sticky material are smoothed down so they stick to the surrounding skin.

2. **Non adherent dressings:** These are basically a low adherent wound pad for pain-free removal of the dressing and it is mostly used for minor wounds. These dressings have been designed to protect the fragile tissue in wounds therefore minimizing trauma upon removal of the dressing or the need for dressing changes.

3. **Hydrocolloid dressing**: are a non-breathable, self-adhesive dressing[2]. They work by creating moist conditions to help speed up healing time and are made out of a flexible material for increased comfort.

4. **Collagen dressings**: are a good alternative to traditional bandaging because they help to promote healing in a number of different ways. Aside from providing a scaffolding system for new cells to accumulate, collagen dressings help remove dead tissue, encourage the formation of new blood vessels, and help tighten the wound's edges.

5. **Gauze dressings**: are made of woven or non-woven materials and come in a wide variety of shapes and sizes. Use on: infected wounds, wounds which require packing, wounds that are draining, wounds requiring very frequent dressing changes.

6. **Sterile dressing**:A dressing should be large enough to totally cover the wound, with a safety margin of about 2.5 cm on all sides beyond the wound.

7. **Sterile non-adherent dressings**: A non-adherent dressing is often covered on one or both sides with a plastic film containing many perforations. If only one side has a plastic film, that is the side to be placed against the wound. This allows fluids to pass through into an absorbent layer, to keep the wound dry.

8. **Improvised dressings**: In an emergency a dressing may be improvised from a range of materials. To control bleeding a bulky pad may be made from a bundle of several facial tissues or from any clean, non-fluffy material.

Steps to apply dressing

1. Get the right wound-care supplies.
2. Wash and dry your hands.
3. Remove the old wound dressing.
4. Clean the wound.
5. Let the wound dry.
6. Apply the new dressing.
7. Secure the new wound-care dressing.

Basic rules to apply dressing

1. Dressing is any material that is applied to a wound with the aim to control bleeding and prevent possible infection.
2. Cover the entire wound and its immediate surrounding areas.
3. Control bleeding.
4. Before applying bandage, make sure the dressing has effectively controlled the bleeding

Dressing Size

A dressing should be large enough to totally cover the wound, with a safety margin of about 2.5 cm on all sides beyond the wound. A sterile **dressing** may be used to control bleeding from a major wound or to absorb any discharge from a minor wound.

BANDAGES

Definition

A bandage is a piece of soft material, tape or cloth that covers and protects an injured part of the body.

It is also used to slow the flow of blood from a cut or another wound.

Types
Roller bandages

Roller bandages are made from lightweight cotton, crepe or elasticized crepe, depending on the pressure to be achieved.

Roller bandages vary greatly depending on how they are to be used. A roller bandage is used to:
1. Hold a dressing in place on a wound
2. Maintain pressure over a bulky pad to control bleeding
3. Support an injured limb or joint
4. Apply pressure to a limb

Applying roller bandages

A roller bandage needs to be chosen carefully to ensure that it is the correct width for the body part involved.

As a general guide the following widths arerecommended:

• Lower arm, elbow, hand and foot – 75 mm.
• Upper arm, knee and lower leg – 100 mm.
• Large leg or trunk – 150 mm.

This will make the bandage easy to use and more likely to stay in place for many hours. However, the correct application technique is essential to provide comfort and adequate support for the affected part.

Basic steps to successful use of a roller bandage:

- Bandage the part in the position of greatest comfort to the patient. Support the part adequately before starting to apply the bandage.
- Hold the tightly rolled bandage with the 'head' of the bandage on top and wrap the 'tail' around the body part without unrolling more than a few centimetres at a time.
- Begin with a locking turn to hold the start of the bandage securely under each following turn.
- Work from the middle of the body or limb in an outwards direction.
- Work from the narrowest part below the dressing and work upwards.
- Ensure that each turn covers two-thirds of the previous turn.
- Cover totally any dressing and padding used.
- Finish with a straight turn at the end of the bandage.
- Secure the bandage with a safety pin or adhesive tape.
- Avoid the use of metal clips because they are less secure and can fall out during activity.

Applying a roller bandage to the lower arm or leg:

- Apply a dressing or padding over the affected area.
- Start with a diagonal, locking turn below the dressing or padding to secure the dressing.
- Continue up the limb, covering two-thirds of each previous turn.
- Finish with a straight turn to secure the bandage and fasten it with a pin or adhesive tape.

Applying a roller bandage to the elbow or knee:

- Apply a dressing or padding over the affected area.
- Start with a full turn over the point of the elbow or knee to secure the bandage.
- Make a second turn just below the first, exposing one-third of the initial turn over the point of the elbow or knee.
- Make a third turn just above the first, again exposing one-third of the initial turn over the point of the elbow or knee.
- Continue with one or two more turns alternately working from below to above the affected joint, until the dressing or padding is fully covered.
- Avoid any extra turns that will cause pressure on the inside surface of the joint.
- Finish with a full turn above the elbow or knee and secure the bandage with a safety pin or adhesive tape.

Applying a roller bandage to the hand or foot:

- Apply a dressing or padding over the affected area.
- Start with a diagonal, locking turn around the wrist or foot.
- Carry the bandage across the back of the hand or foot to the base of the little finger or little toe and then make a complete turns around the fingers or toes.
- Make another turn across the back of the hand or foot from the fingers/toes to the wrist/ankle.
- Repeat these turns working upwards with each turn until the dressing or padding is covered.
- Finish with a circular turn around the wrist ankle and secure the bandage with a safety pin or adhesive tape.

Triangular bandages

Triangular bandages are usually made from a meter square of cotton or calico that is cut in half diagonally. The bandage can be used in various ways as a sling or for immobilization of broken bones and soft tissue injuries.

A triangular bandage is a piece of cloth put into a right-angled triangle, and often provided with safety pins to secure it in place. It can be used fully unrolled as a sling, folded as a normal bandage, or for specialized applications, as on the head.

1. **Sling**

In the open form as a sling to support an upper body injury.

2. **Broad-fold bandage**

As a broad-fold bandage with the apex folded down to the base twice to immobilise a lower body injury.

3. **Narrow-fold bandage**

As a narrow-fold bandage with the broadfold bandage folded in half to control severe bleeding, or for immobilization of a lower limb.As a collar-and-cuff sling for an upper body injury.

4. **Pad**

As a folded pad after the ends of the narrowfold bandage have been brought into the centre three times, and for use on a major wound or as padding.

Uses of Bandage

- A bandage is an aid to support or hold something in place.
- Bandages do not cover wounds, dressings whether with attached bandage or not cover wounds.
- Bandages never directly cover/touch them they hold the dressin in place.

General rule to apply Bandage

1. Use sterile or very clean materials as dressings.
2. Avoid touching the part/s of the dressing that will directly come into contact with the wound.
3. If possible, wash your hands with soap and water before handling the dressing but this should not delay providing emergency care.
4. If using pre-packed dressings, grasp it from the corner of the protective pack and place over the wound.
5. Cover the entire wound and its immediate surrounding areas.
6. Control bleeding. Before applying bandage, make sure the dressing has effectively controlled the bleeding. Continue to apply dressing and manual pressure until bleeding has stopped.
7. Do not remove dressing once it has been applied to a wound. Removing the dressing may restart bleeding and even injure surrounding tissues. If bleeding continues, put new dressings on top of the blood-soaked dressings.

Basic rules for use of bandage

Bandage is any material that is used to hold the dressing in place and provides pressure to the wound. Unlike dressings, bandages may not be sterile.

When applying bandage, you must remember the following basic rules:

1. Not too tight but not too loose.
2. All dressings must be held snugly in place, but the bandage should not be too constricting that it restricts blood flow to the affected part.
3. The bandage should hold the dressing snugly so that it does not slip or move around the wound.
4. Do not leave loose ends as they can get caught on objects when the victim moves. Common loose ends include that of tape, gauze and cloth.
5. Leave the tips of fingers and toes uncovered. The fingers and toes must be exposed to observe changes in skin colour.
6. Cover all edges of the dressing to reduce possible contamination.
7. Apply bandage to a large area of the extremity to ensure uniform pressure.

POWDERS:

The solid form of medication is powder used for internal and external purpose. They are present in crystalline or amorphous form.

Advantages

The advantages of powder are:

1. They are easy to use for the patient.
2. They are more suitable and safer than liquids.
3. If compatibility is less, the practical size is small. Therefore, it easily gets dissolved in fluids.
4. These are easy to carry.
5. More economical than other drugs.
6. As children and old person cannot swallow, the other solid dosage i.e., powder is given through feeding tubes to the patient.

Disadvantages

These are:

1. On exposure to air, the chemical nature of the drug can't be used.
2. The drugs which causes nausea or bitter in taste can't be given in the powder form.
3. Hygroscopic drugs can't be given in the powder form.
4. Drugs which are volatile in nature, can't be given in the powder form.

Classification of Powders:

The powders are broadly classified in the following categories:

Simple and Compound Powder:

1. **Simple Powder**: A simple powder is a one which has only one component. It is crystalline or amorphous in nature.

2. **Compound Powder**: A compound powder contains two or more substances, mixed together and then, divided into different doses.

(A) **Granular Powder:** When, it is difficult to give dose in the large form, tablets and capsules cannot be given. Then, the choice of drugs is produced. However, the taste, when it is bitter, powder is difficult to dispense. Therefore, granular powders are used.

(B) **Bulk Powder:**The bulk quantity is supplied, keeping in view the need of drugs by the patient.These aremeant for internal use. For e.g., antacid or laxative.

(C) **Dusting Powder:** These are used for external purpose on skin for antiseptic, astringents, antiperspirant protective and lubricant purposes. They must be able to protect the skin from irritation from any source.

(D) **Powders Enclosed in Sachet, Pouch and Capsules:** These are also known as Effervescent Powders. These are granular in nature, as they contain citric acid, sodium bicarbonate and tartic acids. When mixed with water, they give Effervescence.

Preparation of Powder

The preparation of powder involves the use of following materials:

S.No.	Materials	Quantity
1.	Talc	5 gms.
2.	Starch	2 gms.
3.	Zinc Oxide	2 gms.
4.	Salicyclic Acid	1 gm.

The powder is made for external application to the skin. It is of two types.

Medicinal Powder.

Surgical Powder.

Medicinal Powder: This type of powder is mainly used for superficial skin conditions. These are free from pathogens and micro-organisms.

Surgical Powder: These types of powders are used in cases of burns and should be sterilized before use. These powders act as antiseptic, astringents, absorbents and anti-percipients actions.

Method of Preparation:

Weight the required quantity of Talc, Zinc Oxide, Starch and Salicyclic Acid. Thoroughly mix all the ingredients in pestle motor. According to their ascending order of their weight. Store them in cool and dry place and label properly.

After preparation of powder, the storage is to be done. For this purpose, store the powder in an air tight container and keep it in cool and dry place.

EMULSION:

A colloidal system in which one liquid is dispersed in another liquid immiscible with it is called an emulsion.

Examples of emulsions include mayonnaise, milk, lotions, etc.

The emulsions are classified into following two types.

(i) **Emulsion of oil in water:** The disperse phase is an oil and the dispersion medium is water. For example, milk containing particles of liquid fat dispersed in water.

(ii) **Emulsion of water in oil:** The disperse phase is water and the dispersion medium is an oil. For example, cod liver oil containing water particles dispersed in oil.

Properties of Emulsions:

1. Emulsion particles unavoidably form dynamic inhomogeneous structures on small length scale.
2. Emulsions are highly unstable systems and require an emulsifying agent or emulsifier (These are usually surface-active agents also known as "surfactants").
3. Emulsions are prepared by continuous mixing or agitation of the two phases.
4. When kept for longer periods of time or in case of absence of an emulsifying agent, the phases in the emulsion tend to separate, resulting in "cracking of emulsion" or " phase inversion".

Uses of Emulsion

1. **As Food:** Oil-in-water emulsions are common in food products. Examples include butter, margarine, homogenized milk, mayonnaise, etc
2. **In Healthcare** Many cosmetic and pharmaceutical dosage forms are in the form of emulsions. Cosmetics such as lotions, creams, biphasic makeup removers are in fact emulsions. Many oral, as well as topical dosage forms, are emulsions. Microemulsions are used to deliver vaccines and kill microbes. Cod liver oil, cortisol, polysporin are some examples of emulsion formulations.
3. **In Chemical Synthesis** Emulsions are used in the manufacturing of polymer dispersions. These include primary components of glues and paints.