Drug Administration

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Drug Administration

The word Pharmacology is derived from two Greek words pharmakon which mean medicine and logos which means study thus, pharmacology is most simply defined as the study of medicine.

Note : More than 10,000 brand -name drugs, generic drugs and combination agents are currently available. Each ha its own characteristics set of therapeutic applications, interactions, side effects and mechanisms of action. Many drugs are prescribed for more than one disease and most produce multiple effects on the body.

- Therapeutics: is the branch of medicine concerned with the prevention of disease and treatment of suffering.
- Pharmacotherapy: is the application of drugs for the purpose of disease prevention and treatment of suffering.
- Drug: is a chemical agent capable of producing biological responses within the body.
- Medication: these responses may be desirable(therapeutic) or undesirable (adverse) after a drug is administrated it is called medication.

Classification of Therapeutics Agents

1.Biologic: are agents naturally produced in animal cells by microorganisms or by body itself such as (hormones, antibodies, natural body product and components.

2.Complementary (Alternative therapies): involve natural plant, extract herbs, vitamin ,minerals, dietary supplements.

Mechanisms of Drug Movement

The mechanisms of drug movement are passive diffusion, facilities diffusion and active transport

- Passive diffusion the most common mechanism involves movement of a drug from an area of higher concentration to one of lower concentration .
- Facilitated diffusion is a similar process except that drug molecules combine with a carrier substances such as enzyme ot other energy.
- Active transport: drug molecules drug action is affected by a drug ability to cross cell membrane .

Variables that affect drug actions

1)Dosage

2)Route of Administration

3)Drug- Diet interactions

4)Drug- Drug Interactions

Variables related Client

1)Age

2)Body weight

3)Genetic and Ethnic Characteristics

4)Pharmacogenetics

5)Gender

6)Pathologic Conditions

7)Psychological Consideration

The Criteria Safe Medication Adminstration (Role)

Nurses have a unique role and responsibility in medication administration, in that they routinely check to make sure the drug is accurately prescribed and delivered before given.The "five rights" or "five R's" of medication administration are a standard part of clinical drug administration training for nursing students.

- The right patient
- The right drug
- The right time
- The right dose
- The right route

In addition

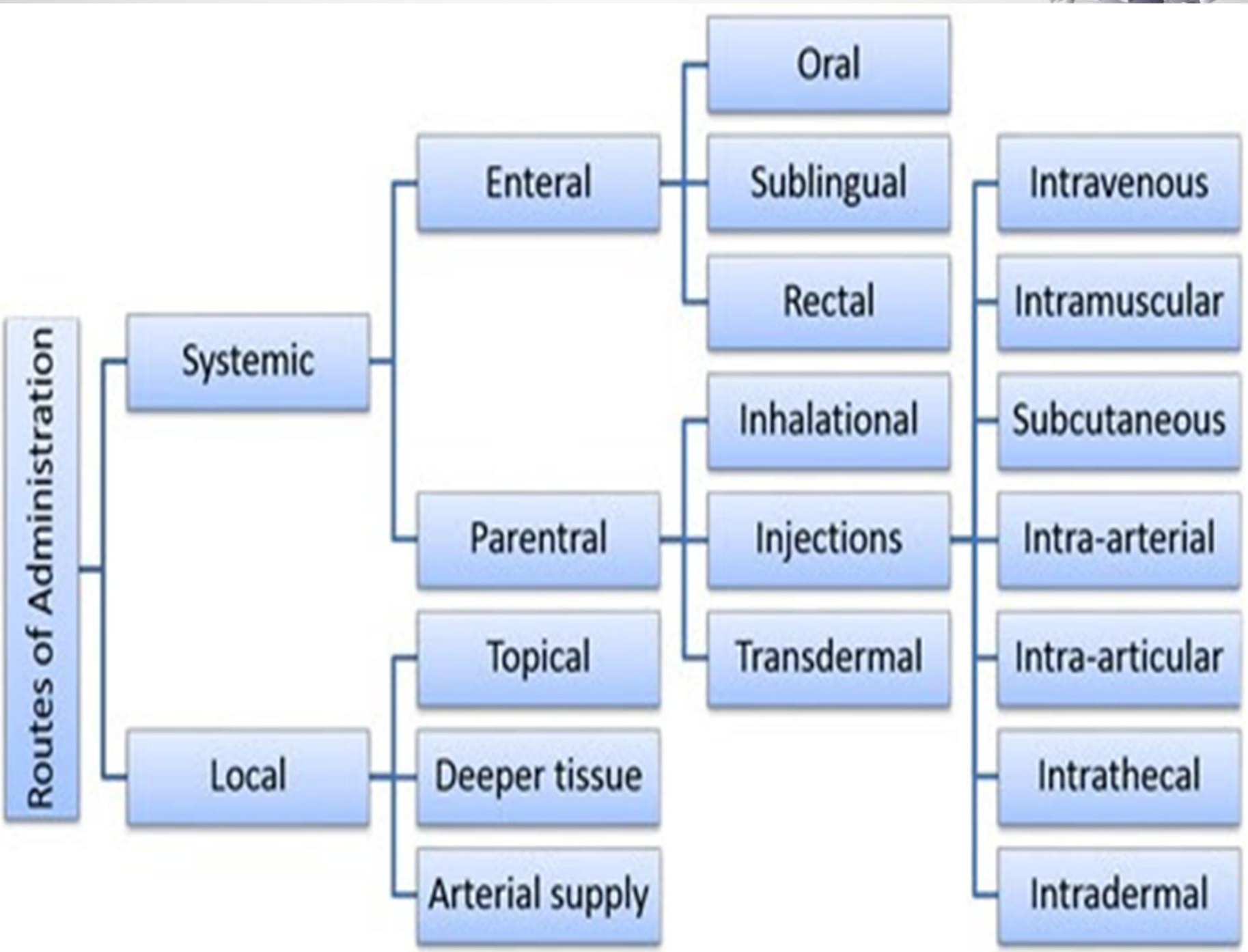
- Right reason
- Right response
- Right refuse
- Right assessment
- Right Documentation

Types of Medication Orders

Types of Medication Orders

- **STAT order**: needed immediately
- **Single order**: given only once
- **PRN order**: given as needed
- **Routine orders**: given within 2 hours of being written and carried out on schedule
- **Standing order**: written in advance carried out under specific circumstances.

The rout of Drug Adminstration


Routes of Administration
Systemic
Local
Enteral
Parentral
Topical
Deeper tissue
Arterial supply
Oral
Sublingual
Rectal
Inhalational
Injections
Transdermal
Intravenous
Intramuscular
Subcutaneous
Intra-arterial
Intra-articular
Intrathecal
Intradermal

Systemic

A. Enteral

1.Oral Adminstration

Advantage

1.Safety route

2. Commonest

3. Cheap

4. No skill required

5. Painless& acceptable

6. Cost -effective

7. No strict sterilzation reauired

- Distadvantage

1. action is slow
2. Gastic irritation may be produce vomiting
3. Not useful in the present vomiting and diarrhea
4. Not usefut in the unconcious and uncooperative patient.
5. Unpleasant taste of some drugs

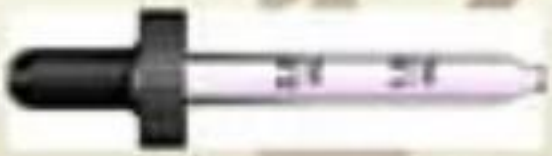
Forms drugs of oral rout

1.Tablet
2. Capsules
3. Syrups
4.Powders
5. Liquid
6.Solutions

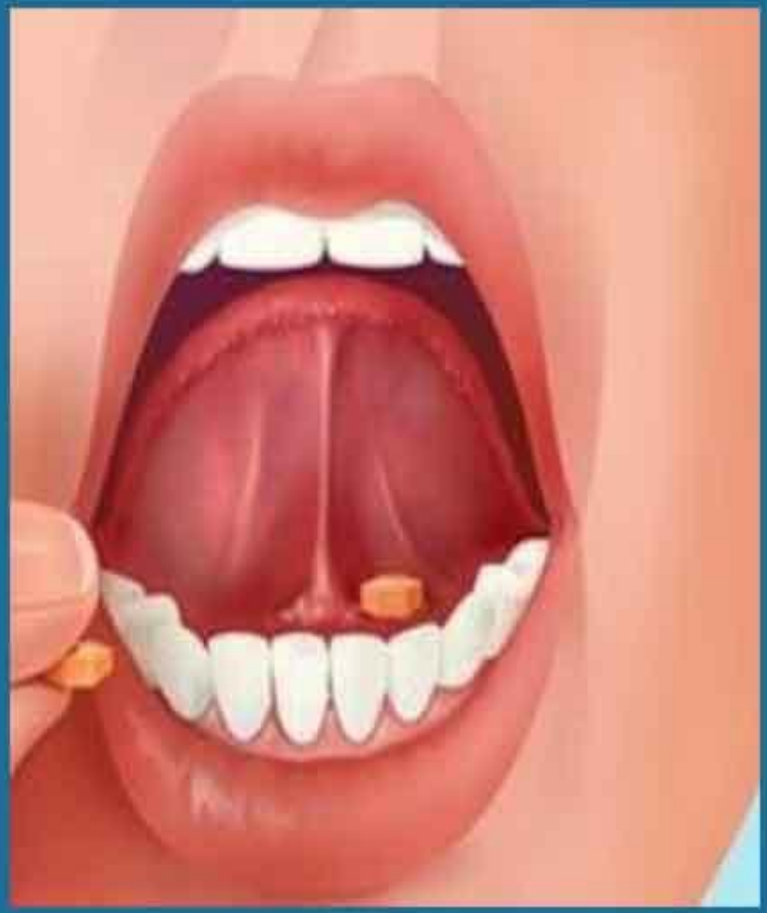
Suspensious

Oral Administration (cont.)

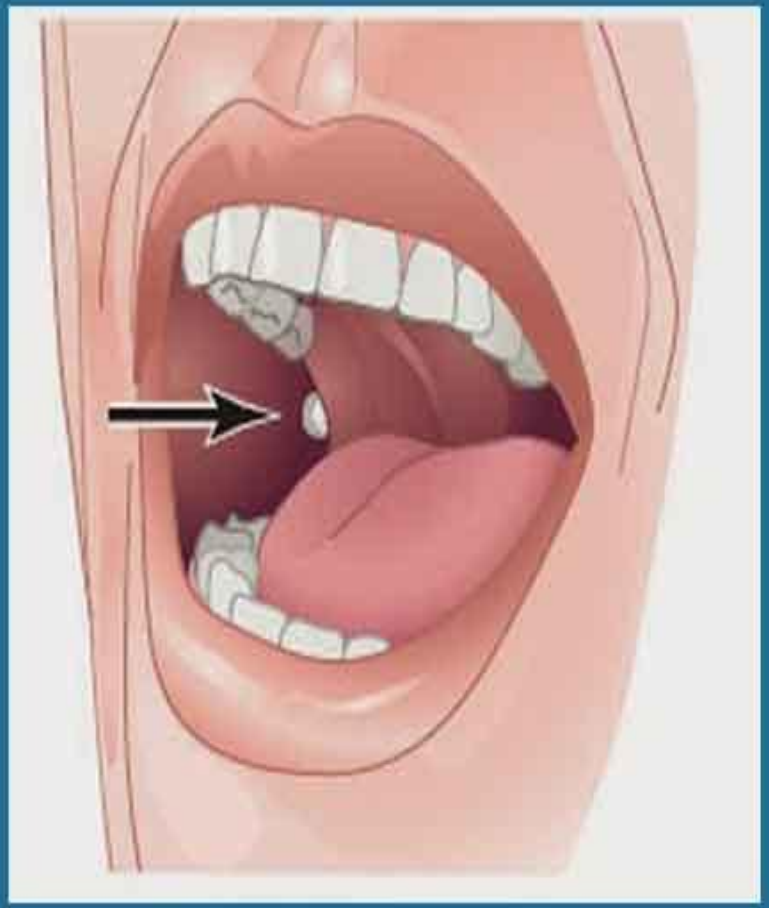
- Equipment
  - Medicine cups
  - Droppers
  - *Calibrated spoons*
  - Oral syringes



2. Sublingual Administration



Sublingual Route



Buccal Route

- Buccal : Placed between the cheek and gum
- Sublingual: Placed under the tongue

Advantage	**Disadvantge**
1. Economical 2. Quick Termination 3. First-pass avoided 4. Drug absorption quickly	1. Irritation of oral mucosa 2. Not given large amount drug. 3. Few drugs are absorbed.

3. Rectum Adminstration

Many drugs that are administered orally can also be administered rectally as a suppository. In this form, a drug is mixed with a waxy substance that dissolves or liquefies after it is inserted into the rectum. Because the rectum's wall is thin and its blood supply rich, the drug is readily absorbed. A suppository is prescribed for people who cannot take a drug orally because they have nausea, cannot swallow, or have restrictions on eating, as is required after many surgical operations. Drugs that are irritating in suppository form may have to be given by injection.

PROCEDURES

- Ensure the child in side lying position
- Insert suppository into the rectum quickly but gently
- Insert suppository above anal sphincter
- Use index finger for insertion

FOR AN INFANT OR CHILD UNDER 3 YEAR OF AGE

- Use fifth finger for insertion
- To prevent expulsion of suppository, hold buttocks together for several minutes

ENEMAS

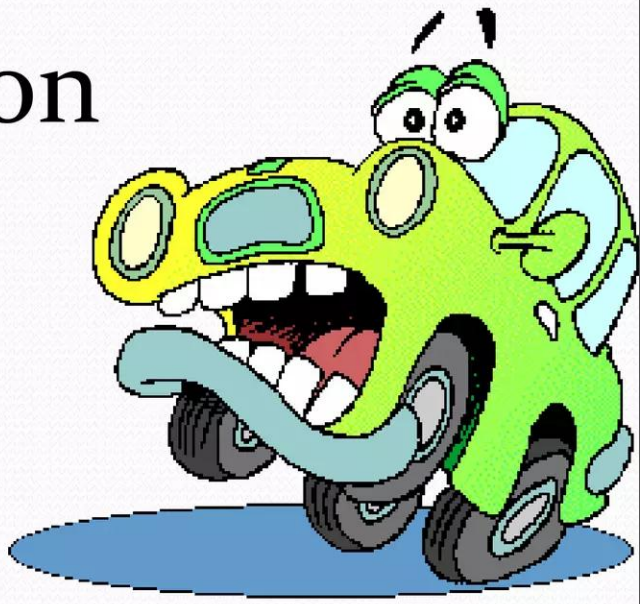
Usually used for cleaning the bowel, it has laxative action. In the case of diseases, drug is administered as enema.

ADVANTAGES

- Could be administered in unconscious patients and children.
- Useful for nauseous patient and children
- Easy to terminate exposure
- Relieve constipation or hemorrhoids

DISADVANTAGES

- Absorption is slow and unpredictable in effectiveness
- Irregular drug absorption
- Inconvenience.



B. Parental

1. Inhalation: is safe rout for patient with respiratory problems.

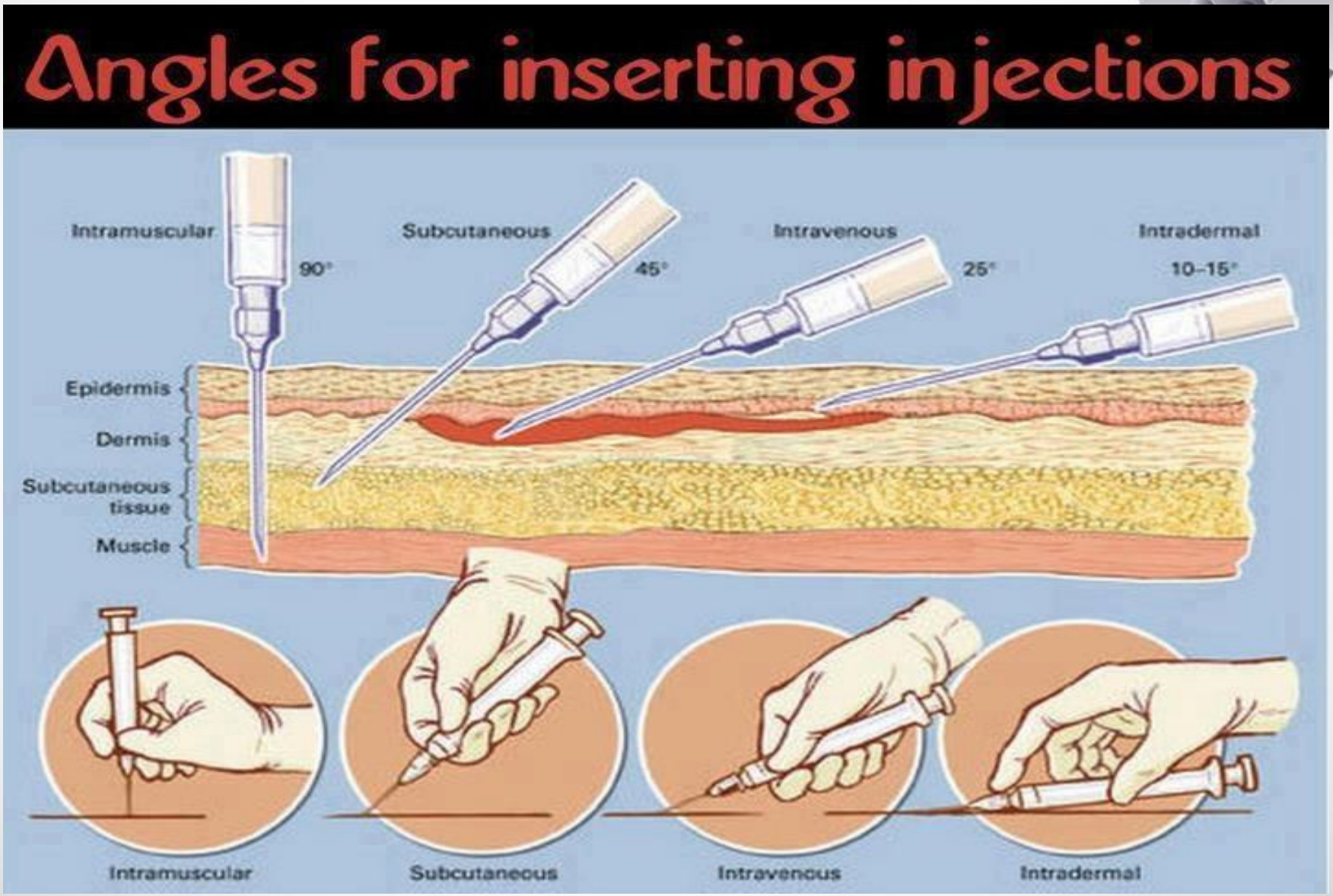
Advantage:

1. Rapid absorption
2. Suitable for emergency
3. Provide local action
4. less side effect
5. Limited systemic effect

Diadvantage

1. Not suitable for irritation drugs
2. Only few drugs can be used

Injection

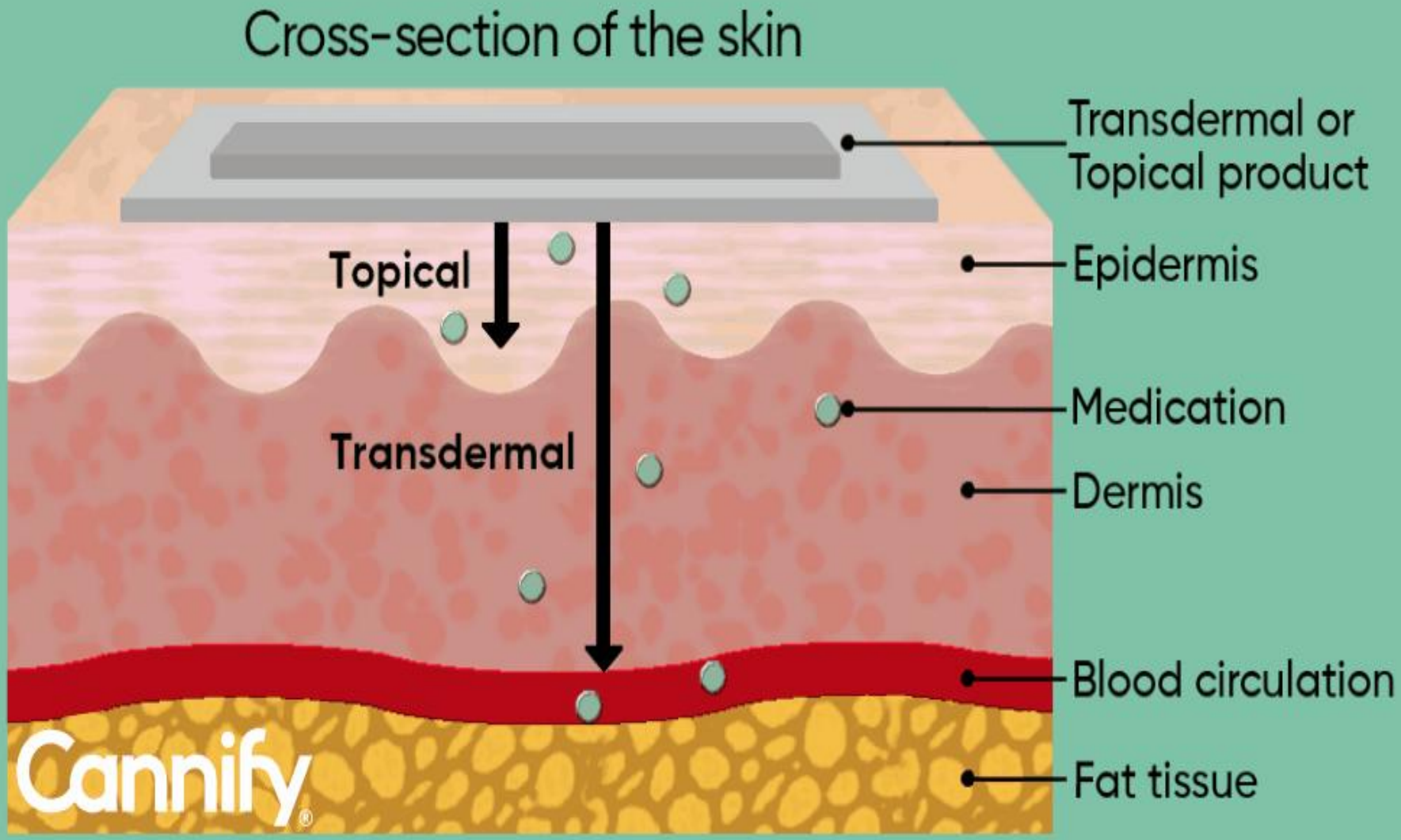

Angles for inserting injections
Intramuscular
90°
Subcutaneous
45°
Intravenous
25°
Intradermal
10–15°
Epidermis
Dermis
Subcutaneous tissue
Muscle
Intramuscular
Subcutaneous
Intravenous
Intradermal

INTRATHECAL

- **ADVANTAGES**
- Drug acts directly on meninges and CNS
- Bypass blood-brain barrier and blood-csf barrier

- **DISADVANTAGES**
- Strict aseptic precautions needed
- Painful procedure
- Expertise needed

Transdermal Administration



Local Administration

Application of the drug directly to the surface of skin. it includes administration of drugs to any mucous membrane. In this type of administration, the desired effect is local.

- Eye
- Nose
- Ear
- Urethra
- Colon

Drug forms of Local Adiminstration Include:

- Creams
- Solutions
- Ointments
- Lotions
- Gels
- Sprays
- Powders


Cream
Ointment

OPHTHALMIC MEDICATION

- They are supplied in the forms of drops or ointments
- Ensure medication is at room temperature
- administer when child is not crying..

PROCEDURE

- place child in supine position
- Slightly hyperextend neck with head lower than body
- Rest the heel of your hand to stabilize on child's forehead
- Retract the lower eyelid & place medication in conjunctival sac.

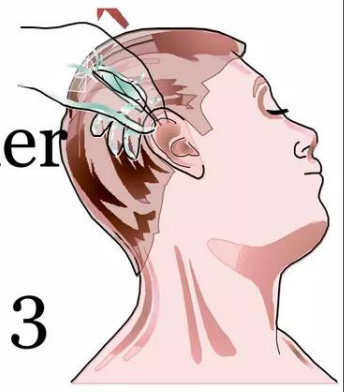
OTIC MEDICATIONS

Typically they are in the form of drops.
This root is upsetting because child cannot see the procedure..

- Ensure that medication is at room temperature.
- Cold ear drops cause pain & vertigo

PROCEDURE

- Place child in supine or side lying position with affected ear exposed.
- Pull pinna downward & back in children under 3 years.
- Pull pinna upward and back in children over 3 years.



NASAL ADMINISTRATION

These medications are typically drops & sprays

Additional help may be needed to keep child's position.

PROCEDURE

- Position child in supine position with hyper extended head to ensure that the drops will flow back to nares.
- A pillow or folded towel can be used to facilitate the hyper extension.
- Place thee tip of the dropper just at or inside nasal opening

ADVANTAGES

- Local therapeutic effects
- Lower risk of side effects
- It offer steady level of drug in the system

DISAVANTAGES

- Messiness
- Irregular drug absorption
- Improper technique leads to risk of side effects
- Alter drug efficacy

Drug Calcualti on

Preparation

- 1 kg = 2.2 lb
- 1 tsp = 5 mL
- 1 L = 1,000 mL
- 1 kg = 1,000 g
- 1 g = 1,000 mg
- 1 mg = 1,000 mcg
- 1 cc = 1 mL
- 60 minute = 1 hour

Abbreviation

Abb	Meaning	Abb	Meaning
tsp	teaspoonful	q.i.d	four times a day
a.c	before meals	mcg	microgram
b.i.d	twice a day	s.i.d	once a day
dil.	Dilute	t.i.d	three times a day
d	day	gtt	drop
q	every	Sol	Solution
p.o	by mouth (orally)	Oz	Ounce
qAM	every morning		
q4h	every 4 hours		

General aspects for the calculation of Pediatric Dose

To calculate the Pediatric Dose of a drug, you need to know 3 essential data:

- Patient weight (Kg).
- Drug dosage.
- Presentation of the drug.

“

For example Calculate the Dose of Paracetamol.

How to calculate the Dosage of Medicines in Pediatrics

To calculate the Pediatric Dose of a drug, the Weight in Kg or the Body Surface can be used. However, the most used method is based on Weight in Kg. In this article I will explain you step by step how to do it.

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

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

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

Total dose ⇒ (12 Kg) x (15mg) = 180 mg

Depending on the brand and manufacture, concentrations may vary. In the case of Paracetamol Syrup, the most common concentration is 120mg / 5ml.

mL to be administered = (Total Medication Dose) / (mg of presentation) x (ml of presentation)

mL to be administered = (180 mg) / (120 mg) x (5ml) ⇒ (1.25) x (5ml) = 7.5ml every 4-6 hours

Acetaminophen in presentation of 120mg / 5mL

Pediatric Dose Calculation in Special Situations such as Anibiotics (sulfamethoxazole)

- Certain Medications may seem a bit more complicated. Sulfamethoxazole is an antibiotic whose dose is 8mg / Kg / day divided into doses every 12 hours.

- But its presentation in syrup is (40mg / 5mL) which essentially says that it has 40 mg of sulfamethoxazole every 5 mL. But when calculating the Pediatric Dose.

Total dose = (12 Kg) x (8 mg) = **96 mg.**

mL to be administered = (96 mg) / **(40 mg) x (5mL)** ⇒ (2.4) x (5mL) = 12mL

mL to be administered every 12 hours = (12mL) / 2 = 6mL every 12 hours.

For example 2

The majority of Antibiotics administered by Oral Route come in the form of Syrup. The classic example is Amoxicillin. Which has a dose of 80 mg / Kg / day divided into doses every 8 or 12 hours.

Total dose = (12 Kg) x (80 mg) = 960 mg.

mL to be administered = (960mg) / (250mg) x (5mL) ⇒ (3.84) x (5mL) = 19.2 mL

mL to be administered every 8 hours = (19.2 mL) / 3 = 6.4 mL every 8 h.

Pediatric doses of drugs in drops.

An example of this is Cefixime. It has a dose of 8 mg / Kg / day. In this case the dose is every 24 hours. The presentation is usually in syrup with a concentration of 100mg / 1mL. If we calculate the dose to be administered in a child weighing 10 kg, it would be:

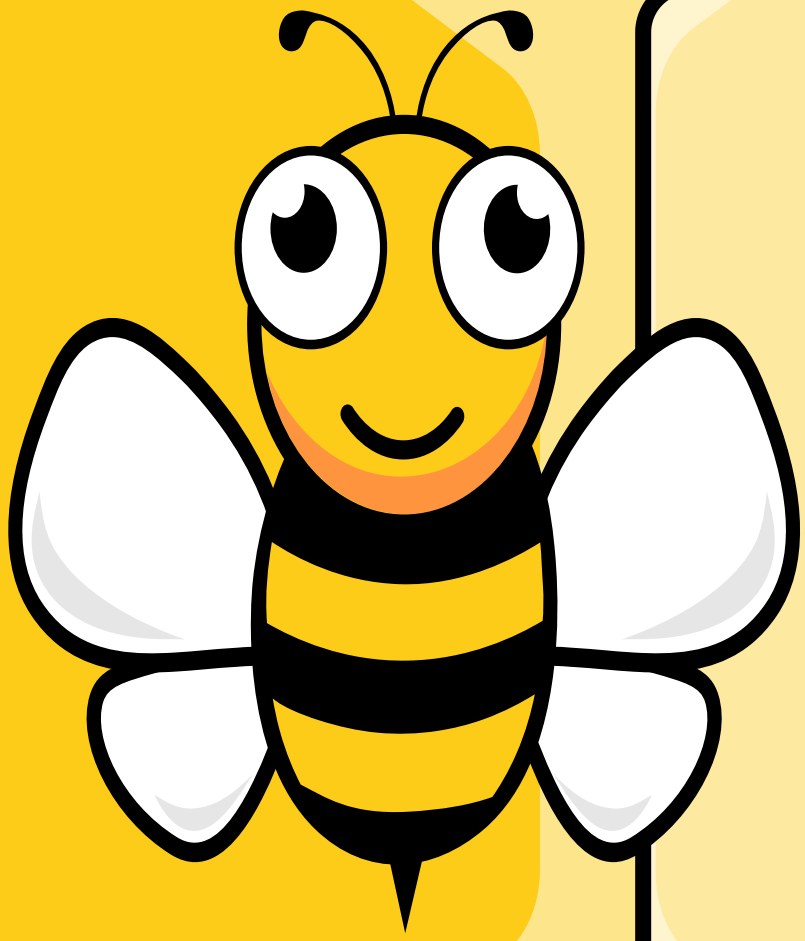
Total dose = (10 Kg) x (8mg) = 80 mg

mL to be administered = (80mg) / (100mg) x (1mL) ⇒ (0.8) x (1mL) = **0.8mL every day**

- To calculate the Dose of medicines in pediatrics in drops, we only have to multiply the amount of mL to be administered by 20. **(Remember that 20 drops make 1 mL)**

Drops to administer = (mL to administer) x 20.

Drops to be administered = (0.8 mL) x 20 = 16 drops every day.



Questions

For example, a 7-year-old child who weighs 21.2 Kg and who should be given Paracetamol would have a total dose of 318 mg (calculated at 15mg / Kg / dose) and we should give him 13.25 mL every 6 hours.

Calculate Pediatric Dose of Intramuscular and Endovenous drugs.

Simple drug calculation

- The calculation of the dose of medications administered by IM or EV is basically the same as those administered by PO.
- For example Diclofenac. It has a dose of 0.5 to 1 mg / Kg / dose which can be repeated every 8 hours. The most common presentation of Diclofenac is 75mg / 3mL.

- If we calculate the dose to be administered to a 6-year-old patient whose weight is 20 kg then we will have:

- **Total dose = (20 Kg) x (1mg) = 20 mg.**
- **mL to be administered = (20 mg) / (75 mg) x (3mL) ⇒ (0.26) x (3mL) = 0.8 mL every 8 hours.**
- The indication would be valid as: Diclofenac 20 mg I.M C / 8 hours. However, remember that the medication will be administered in mL. Therefore, it is necessary to determine how many mL should be administered via IM to the patient

Calculate Pediatric Dose based on mg or mL administered.

Formula to calculate Pediatric Dose based on mg administered

Then to calculate the Pediatric Dose of a drug based on the mg administered we will apply the following formula:

Medication dose = (mg administered) / (Weight in Kg).

if we have a 3-year-old child weighing 14 kg with an indication from the previous medical that says “Gentamicin 70 mg EV every 24 hours”. What dose did they use to calculate Gentamicin?

Medication dose = (70 mg) / (14 Kg) = 5 mg / Kg / every 24 hours.

Another Example

Vancomycin

Adminstration

1. 500 mg vial+ 10 ml distal water =

500/10= 50mg\ml

2. 1 gm vial +20 ml distal water =

1000/1=20= 50 mg\ml

Patient dose in mg/ 50 = patient dose in ml

Patient dose in mg / 5 = amount of fluid

- Patient wt=10 kg
- Vancomycin vial 500 mg
- Dose require?

Step1: 500 mg/10 ml = 50 mg\ml

Step 2: Dose= wt*15 = 10*15 =150 mg voncomysin.

Step 3: 150 / 50 = 3 ml (50 mg each 1 ml)

Step 4: 150/5= 60 (add 3 ml to 60 ml of fluid through 2 hours.

Q1/ A 3-year-old boy weighing 10Kg consulted with a 7-hour history of Febrile Process. The temperature is measured at 39 ° C, so it is decided to administer Paracetamol. What dose and how many mL should be administered?

Q2 / the patient weight 5 kg, need aminophline in dose 5 mg/kg, in addition the ampoule contain 250 mg in 10 ml . What dose and how many mL should be administered?

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