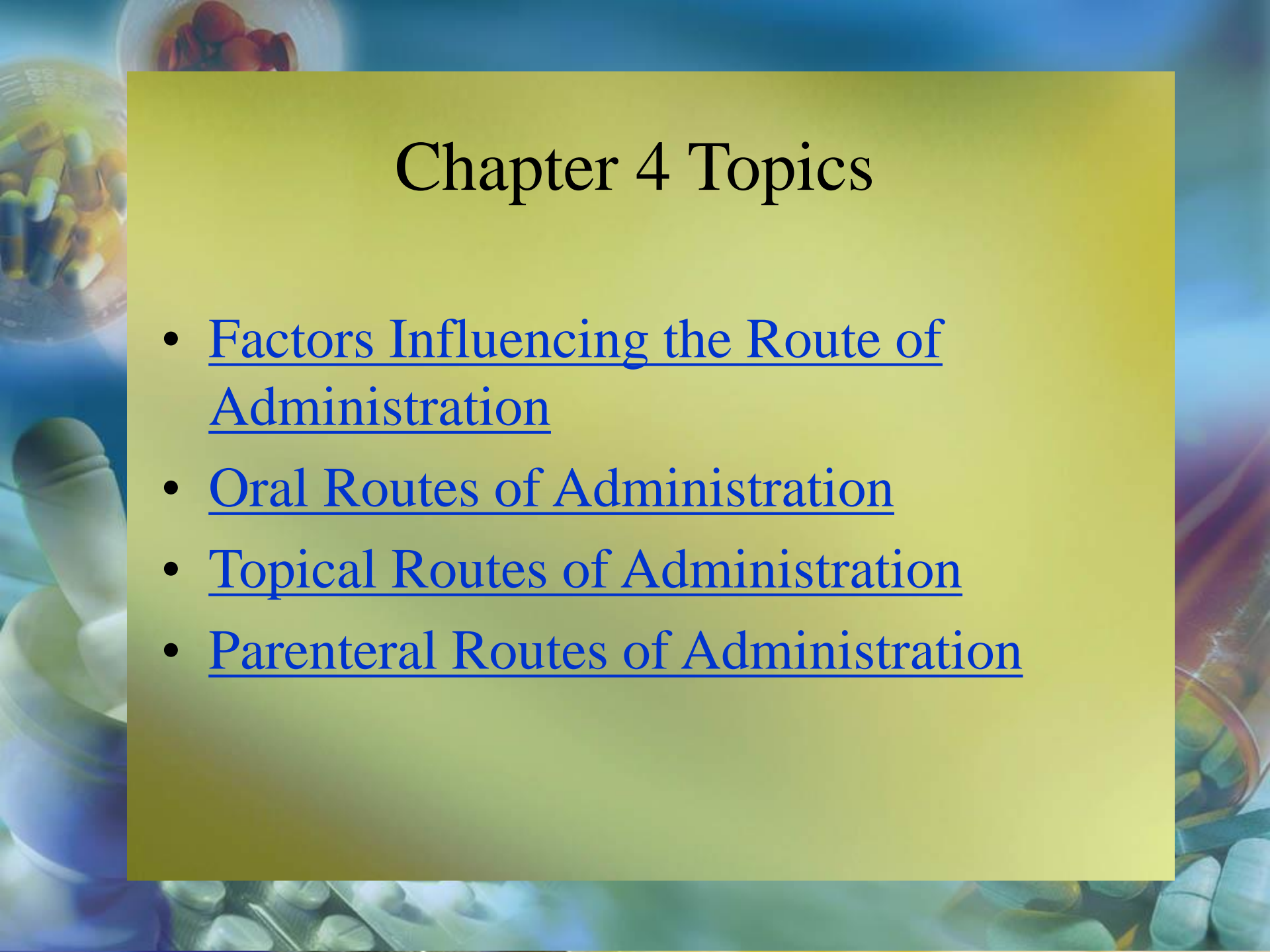


# ROUTE OF DRUG ADMINISTRATION



Unit II nd (Pharmacology)



# Chapter 4 Topics

- Factors Influencing the Route of Administration
- Oral Routes of Administration
- Topical Routes of Administration
- Parenteral Routes of Administration

# Learning Objectives

- Define the phrase **route of administration**
- Identify the **factors** that can influence the route of administration
- Define the terms **local use** and **systemic use**, and explain how these uses are considered when a prescriber selects a drug for a particular patient
- List the **major routes of administration** and the advantages and disadvantages associated with each dose form
- Discuss correct techniques for administration of **oral**, **topical**, and **parenteral** dose forms including IV, IM, ID, and subcutaneous

# Factors Influencing the Route of Administration

- A *route of administration* is a way of getting a drug onto or into the body
- Drugs come in many different forms:
  - designed by pharmaceutical scientists for administration or application
- Many factors determine the choice of route of administration

# Ease of Administration

- Prescribers assess characteristics to determine route of administration
  - some patients are unable swallow
  - very young or older adult patients might have difficulty swallowing
    - avoid solid, oral dose forms in favor of liquid dose forms or nonoral routes of administration
  - oral route of administration is inadvisable for a patient experiencing nausea and vomiting

# Site of Action

- Choice of route of administration is influenced by desired site of action
- The term *local use* refers to site-specific applications of drugs
- The term *systemic use* refers to the application of a drug to the site of action by absorption into the blood and subsequent transportation throughout the body
  - even drugs meant for systemic administration are usually targeted to a specific site of action



# Onset of Action

Onset rate varies with route of administration:

- Oral medications for systemic use must proceed through a series of steps before they exert their *therapeutic effect* (desired pharmaceutical action on the body)
- Liquid solutions or suspensions work faster than oral tablets or capsules
  - medication is more readily available for absorption

# Onset of Action

- Tablets placed under tongue or between cheek and gums work quickly
  - medication bypasses stomach and liver, goes directly into bloodstream
- Drugs injected/infused directly into bloodstream are carried immediately throughout the body
- Topical medications work quickly
  - localized therapeutic effects, especially those
    - applied to the skin
    - inhaled into the lungs
    - instilled into the eye



# Duration of Action

- The *duration of action* is the length of time a drug gives the desired response or is at the therapeutic level
- Controlled- /extended-release tablet may last for 12 to 24 hours compared with 4 to 6 hours for same drug in immediate-release formulation
- Transdermal patches deliver small amounts of a drug steadily over many hours or even days
- Sustained-duration effect can be achieved by means of intravenous (IV) infusion
- Injections into the muscle and skin last longer than injections directly into the bloodstream

# Quantity of Drug

- Sometimes route of administration is chosen because of the amount of a drug
  - a tablet containing a lot of filler (diluent) might be preferred for a drug containing a very small amount of active ingredient
- IV infusion is an excellent method for systemic delivery of large quantities of material
  - rapidly diluted in the bloodstream
- IV injections and infusions can deliver a higher dose of medication to the target site
  - important in serious illnesses

# Metabolism by the Liver or Excretion by the Kidney

- Liver metabolism breaks down active drug to inactive metabolites for elimination and to prevent drug accumulation
- The *first-pass effect* is the extent to which a drug is metabolized by the liver before reaching systemic circulation
  - influences activity of several drugs
  - such drugs have to be given in large oral doses or by another route of administration to bypass or overcome metabolism by the liver

# Metabolism by the Liver or Excretion by the Kidney

- Age-related or disease-related changes in liver or kidney function can cause:
  - drug accumulation
  - toxicity
- Older patients are often prescribed lower doses of medication
- If patients are on multiple potent prescription drugs, there is a risk of a drug-drug interaction
  - drug accumulation
  - toxic blood levels increases

# Toxicity

- *Toxicology* is the study of toxic effects of drugs or other substances on the body
- Physicians must weigh therapeutic benefit against the risk of toxicity
- Some drugs have a narrow therapeutic-toxic index called the “therapeutic window”
  - very little difference exists in the therapeutic versus toxic blood level
  - laboratory drug levels are ordered if the physician suspects toxicity
- Toxicity of a drug may affect route of administration



# Discussion

What factors may influence the choice of a route of administration for a drug?





# Discussion

What factors may influence the choice of a route of administration for a drug?

***Answer:*** Choice of route of administration may be influenced by ease of administration, site of therapeutic action, desired onset and duration of action, quantity of drug to be administered, characteristics of metabolism and excretion, and toxicity.



## *Terms to Remember*

- route of administration
- local use
- systemic use
- therapeutic effect
- duration of action
- first-pass effect
- toxicology

# Oral Routes of Administration

- Oral refers to two methods of administration:
  - applying topically to the mouth
  - swallowing for absorption along the gastrointestinal (GI) tract into systemic circulation
- *po* (from the Latin *per os*) is the abbreviation used to indicate oral route of medication administration

# Oral Dose Forms

- Common dose forms for *oral administration*
  - tablets
  - capsules
  - liquids
  - solutions
  - suspensions
  - syrups
  - elixirs

# Oral Dose Forms

- ***Sublingual administration*** is where the dose form is placed under the tongue
  - rapidly absorbed by sublingual mucosa
- ***Buccal administration*** is where the dose form is placed between gums and inner lining of the cheek (buccal pouch)
  - absorbed by buccal mucosa
- Dose forms for sublingual and buccal administration:
  - tablets
  - lozenges
  - gum

# Oral Dose Forms

- Capsules are preferred over tablets for patients with difficulty swallowing
- Water preferred over beverages to aid in swallowing
- Some dose forms are designed to be sprinkled on food when swallowing a solid is difficult
- Liquid doses are swallowed more easily and are suitable for:
  - patients with swallowing difficulties
  - small children





# Oral Dose Forms

*Safety*

*Note*

The oral route is not appropriate for patients who are unable to swallow.

# Advantages and Disadvantages of the Oral Route

- Ease and safety of administration
- Active ingredient is generally contained in powders or granules which dissolve in GI tract
- Sublingual (and buccal) administration has a rapid onset (less than 5 minutes)

# Advantages and Disadvantages of the Oral Route

- Delayed onset
  - dose form must disintegrate before absorption
- Destruction or dilution of drug by
  - GI fluids
  - food or drink in stomach or intestines
- Not indicated in patients who
  - have nausea or vomiting
  - are comatose, sedated, or otherwise unable to swallow
- Unpleasant taste of some liquid dose forms
  - must be masked by flavorings to promote compliance

# Advantages and Disadvantages of the Oral Route

- Sublingual (and buccal) administration has a short duration of action
  - less than 30 to 60 minutes
  - not appropriate for routine delivery of medication
- Buccal route may have
  - medicinal taste
  - local mouth irritation

# Dispensing Oral Medications

Patients should be told:

- Not to crush tablets or open capsules intended to be swallowed whole
  - e.g., sustained-release, long-acting, and enteric-coated drugs
- What foods to take (and not take) the medication with
- What behaviors to avoid while taking the medication

# Dispensing Oral Medications

The dispensed drug package may include colorful “auxiliary” labels to remind the patient what to do (or not do) while taking a medication





# Dispensing Oral Medications

- Patients need instruction on proper storage of nitroglycerin
- Sublingual nitroglycerin tablets should be stored in their original container (brown glass bottle)
  - lid screwed on tightly to prevent sunlight and air from causing potency loss
  - pillboxes are not recommended
  - refill nitroglycerin with a fresh bottle every 6 months

# Dispensing Oral Medications

*Safety*

**Note**

Always check the manufacturer recommendations for storage and expiration dating on reconstituted products.

# Dispensing Oral Medications

*Safety*

*Note*

When suspensions are dispensed, remind patients to store properly and shake the bottle before dosing.

# Administering Oral Medications

- Patients with difficulty in swallowing solids should place the dose on the back of the tongue and tilt the head forward
- Liquid medication doses must be accurately measured
  - in a medication cup
  - medication measuring spoon
- Common household utensils are not accurate
  - an oral syringe or measuring dropper may be used for infants or small children



# Administering Oral Medications

- **Buccally administered nicotine gum**
  - proper administration allows the gum to release nicotine slowly and decrease cravings
- **Proper administration technique:**
  1. Chew the gum slowly and stop chewing when you notice a tingling sensation in the mouth.
  2. “Park” the gum between the cheek and gum, and leave it there until the taste or tingling sensation is almost gone.
  3. Resume slowly chewing a few more times until the taste or sensation returns.
  4. Park the gum again in a different place in the mouth.
  5. Continue this chewing and parking process until the taste or tingle no longer returns when the gum is chewed (usually 30 minutes).

# Administering Oral Medications

*Safety*

*Note*

If nicotine gum is chewed vigorously, then too much nicotine will be released, causing unpleasant side effects.

# Administering Oral Medications

- Proper administration technique for buccally administered lozenges:
  1. Allow lozenge to dissolve slowly over a 30-minute period without chewing or swallowing.
  2. A tingling sensation (from the release of nicotine) is expected.



# Oral Routes of Administration

*Safety*

**Note**

Remind the patient not to eat or drink for 15 minutes before or while using gum or lozenge dose forms.



# Discussion

- What are some advantages of the oral route?
- What are some disadvantages?



# Discussion

- What are some advantages of the oral route?

*Answer:* Ease and safety, rapid onset (for buccal and sublingual)

- What are some disadvantages?

*Answer:* Care needed for administration (shaking suspensions, measuring liquids, special instructions for buccal)



## *Terms to Remember*

- oral administration
- sublingual administration
- buccal administration

# Topical Routes of Administration

- *Topical administration* is the application of a drug directly to the surface of the skin
- Includes administration of drugs to any mucous membrane
  - eye
  - nose
  - ears
  - lungs
  - vagina
  - urethra
  - colon

# Topical Dose Forms

Dose forms for topical administration include:

- **Skin:**
  - creams
  - ointments
  - lotions
  - gels
  - transdermal patches
  - disks
- **Eye or ear:**
  - solutions
  - suspensions
  - ointments
- **Nose and lungs:**
  - sprays and powders

# Topical Dose Forms

Dose forms for topical administration include:

- Vagina:
  - tablets
  - creams
  - ointments
- Urethra:
  - inserts
  - suppositories
- Rectum:
  - creams
  - ointments
  - solutions
  - foams



# Topical Dose Forms

- **Transdermal administration:**
  - delivers drug to bloodstream via absorption through the skin via a patch or disk
- **Skin presents a barrier to ready absorption**
  - absorption occurs slowly
  - therapeutic effects last for 24 hours up to 1 week
- **Chemicals in the patch or disc force drug**
  - across membranes of the skin
  - into layer where absorption into bloodstream occurs

# Topical Dose Forms

- Ocular administration is the application of a drug to the eye
- Conjunctival administration is the application of a drug to the conjunctival mucosa or lining of the inside of the eyelid
- Nasal administration is the application of a drug into the passages of the nose
- Otic administration is the application of a drug to the ear canal

# Topical Dose Forms

Rectal dosage forms:

- **Suppository**
  - solid dose form formulated to melt in the rectum at body temperature and release the active drug
- **Creams, ointments, and foams**
  - used for local effects
- **Rectal solutions, or enemas used for**
  - cleansing the bowel
  - laxative or cathartic action
  - drug administration in colon disease

# Advantages and Disadvantages of the Topical Route

- Local therapeutic effects
- Not well absorbed into the deeper layers of the skin or mucous membrane
  - lower risk of side effects
- Transdermal route offers steady level of drug in the system
  - sprays for inhalation through the nose may be for local or systemic effects

# Advantages and Disadvantages of the Topical Route

- The *intrarespiratory route* of administration is the application of drug through inhalation into the lungs, typically through the mouth
  - lungs are designed for exchange of gases from tissues into bloodstream
  - usual dose form is an aerosol
  - “environmental friendly” propellants now required to replace chlorofluorocarbons (CFCs)

# Advantages and Disadvantages of the Topical Route

- A *metered-dose inhaler (MDI)* is a common device used to administer a drug in the form of compressed gas through inhalation into the lungs
- A diskus is a newer dosage form to administer drug to lungs as micronized powder

# Advantages and Disadvantages of the Topical Route

- The *vaginal route* of administration is application of drug via cream or insertion of tablet into the vagina
- Common dose forms include:
  - emulsion foams
  - inserts
  - ointments
  - solutions
  - sponges
  - suppositories
  - tablets



# Advantages and Disadvantages of the Topical Route

- The vaginal route is preferred for:
  - cleansing
  - contraception
  - treatment of infections
- Major disadvantages:
  - inconvenience
  - “messiness”

# Advantages and Disadvantages of the Topical Route

- The *urethral route* of administration is application of drug by insertion into the urethra
- Common dose forms include:
  - solutions
  - suppositories
- Urethral delivery may be used to treat
  - incontinence
  - impotence in men
- Disadvantages
  - inconvenience
  - localized pain

# Advantages and Disadvantages of the Topical Route

Rectal administration is a preferred method when:

- An oral drug might be destroyed or diluted by acidic fluids in the stomach
- An oral drug might be too readily metabolized by the liver and eliminated from the body
- The patient is unconscious and needs medication
- Nausea and vomiting or severe acute illness in the GI tract make patient unable to take oral drugs

# Advantages and Disadvantages of the Topical Route

- Rectal administration disadvantages:
  - inconvenience
  - erratic and irregular drug absorption

# Dispensing and Administering Topical Medications

- It is important for the patient to understand appropriate use and administration of topical drugs at the time of dispensing
- Improper technique or overuse of topical drugs can
  - increase the risk of side effects
  - alter drug efficacy

# Ointments, Creams, Lotions, and Gels

- Dose forms should be applied as directed
  - generally applied to the skin
  - lotions, creams, and gels are worked into the skin
  - ointments are skin protectants and do not work into the skin but stay on the surface
- When using nitroglycerin ointment the patient or caregiver should wear gloves
  - to avoid absorbing excessive amounts of drug, which could cause a headache

# Ointments, Creams, Lotions, and Gels

When using topical corticosteroids:

- Apply sparingly to affected areas for short periods of time
- Affected area should not be covered up with a bandage unless directed by the physician
  - occlusive dressings can significantly increase drug absorption and risk of side effects
- Overuse of potent topical corticosteroids can lead to serious systemic side effects



# Transdermal Patches

- Site of administration must be rotated and relatively hair free
- Should not be placed over a large area of scar tissue
- Some are replaced every day, others maintain their effect for 3 to 7 days
- Some patients should remove nitroglycerin patch at bedtime to prevent development of *drug tolerance* where the body requires higher doses of drug to produce the same therapeutic effect.
- Some testosterone patches are applied to the skin of the scrotum

# Transdermal Patches

*Safety*

*Note*

Transdermal patches should be carefully discarded after use because they could cause serious side effects if ingested by young children or pets.

# Ophthalmic Medications

- Must be at room temperature or body temperature before application
- Should be stored according to package information
  - reduces bacterial growth
  - ensures stability
- Considered sterile products
  - only preparations with preservatives can be repeatedly used

# Ophthalmic Medications

*Safety*

*Note*

- Unused medication should be discarded 30 days after the container is opened.
- Manufacturer expirations do not apply once a patient has opened the medication.

# Ophthalmic Medications

- Before application, patient should wash hands
  - prevents contamination of application site
- Tube or dropper should not touch the application site
  - medication may become contaminated
- Only sterile ophthalmic solutions or suspensions should be used in the eye
  - **not** preparations intended for other uses (e.g., otic)
- Some products are unit of use
  - to be used for one administration only and then discarded

# Ophthalmic Medications

*Safety*

*Note*

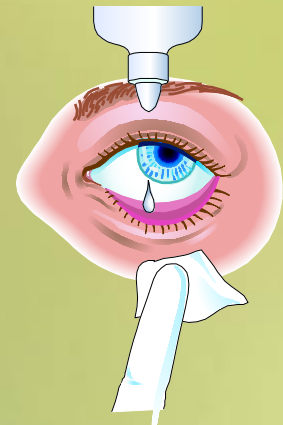
Ear drops can never be used in the eye, but eye drops can be used in the ear.

# Ophthalmic Medications

- Previously applied medications should be cleaned away
  - also any drainage from the eye
- Intended location is the conjunctiva
- Poorly administered eye drops could result in loss of medication through the tear duct
- Poorly placed ointments may be distributed over the eyelids and lashes

# Ophthalmic Medications

- Patient's head should be tilted back
- After administration, the patient should place a finger in the corner of the eye, next to the nose to close the lacrimal gently
  - prevents loss of medication through tear duct
- Patient should also keep the eyes closed for 1 or 2 minutes after application



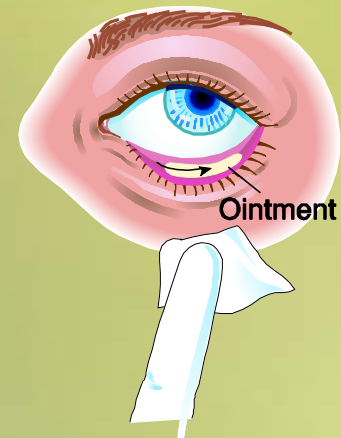


# Ophthalmic Medications

- When multiple drops of more than one medication are to be administered, the patient should wait 5 minutes between different medications
  - the first drop may be washed away
- If an ointment and a drop are used together, the drop is used first
  - wait 10 minutes before applying the ointment

# Ophthalmic Medications

- Ointments are generally applied at night
  - drug form of choice when extended contact with the medication is desired
  - remind patient that some temporary blurring of vision may occur after application



# Otic Medications

- Must be at room temperature or body temperature
  - heated drops may cause rupturing of the eardrum
  - cold drops can cause vertigo and discomfort
- Old medication should be removed along with any drainage before applying fresh medication
- Alcohol causes pain and burning sensation
  - should not be used if the patient has a ruptured tympanic membrane (eardrum)

# Otic Medications

- Tilt head to side with ear facing up
  - 2 to 5 minutes
- Cotton swabs placed in the ear after administration of drops will prevent excess medication from dripping out of the ear
  - swabs will not reduce drug absorption



Patients under 3 should have lobes pulled down and back.



Patients over 3 should have lobes pulled up and back

# Nasal Medications

- Applied by:
  - drops (instillation)
  - sprays
  - aerosol (spray under pressure)
- Used for:
  - relief of nasal congestion or allergy symptoms
  - administration of flu vaccine

# Nasal Medications

- Patient should:
  - tilt head back
  - insert dropper or spray or aerosol tip into the nostril pointed toward the eyes
  - apply prescribed number of drops or sprays in each nostril
- Breathing should be through mouth to avoid sniffing medication into the sinuses
- Important not to overuse nasal decongestants
  - follow label instructions carefully

# Inhaled Medications



- Metered-dose inhalers (MDI) provide medication with compressed gas
  - deliver specific measured dose with each activation

# Inhaled Medications

*Safety*

*Note*

If an MDI contains a steroid, the patient should rinse the mouth thoroughly after dose to prevent oral fungal infection.



# Inhaled Medications

- Some devices use a powder or nonaerosolized spray for inhalation instead of compressed gas
- Nebulizers create a mist when a stream of air flows over a liquid
  - commonly utilized for young children or elderly patients with asthma or lung disease

# Inhaled Medications

Proper administration of aerosolized medications:

1. Shake canister well
2. “Prime” by pressing down and activating a practice dose.
3. Insert canister into a mouthpiece or spacer to reduce the amount of drug deposited on the back of the throat.
4. Breathe out and hold spacer between lips making a seal.
5. Activate MDI and take a deep slow inhalation.
6. Hold breath briefly and slowly exhale through the nose.

# Vaginal Medications

- Indicated for
  - bacterial or fungal infection
  - hormone replacement therapy
- The patient is instructed to use the medication for the prescribed period to ensure effective treatment

# Vaginal Medications

Application should follow a specific technique:

1. Begin with an empty bladder and washed hands.
2. Open the container and place dose in applicator.
3. Lubricate applicator with water-soluble lubricant if not pre-lubricated.
4. Lie down, spread the legs, open the labia with one hand, and insert the applicator about two inches into the vagina with the other hand.
5. Release labia; use free hand to push applicator plunger.
6. Withdraw the applicator and wash the hands.

# Rectal Medications

- **Suppository**
  - remove suppository from its package
  - insert small tapered end first with index finger for the full length of the finger
  - may need to be lubricated with a water-soluble gel to ease insertion
- **Enemas**
  - rectal injection of a solution

# Rectal Medications

*Safety*

*Note*

Refrigeration may make insertion of rectal medications easier in warm climates.



# Discussion

What is the main advantage of topical routes of administration?



# Discussion

What is the main advantage of topical routes of administration?

***Answer:*** Topical administration can be used to deliver a medication directly to the site where its action is expected or desired.





## *Terms to Remember*

- topical administration
- intrarespiratory route
- metered-dose inhaler (MDI)
- vaginal route
- urethral route
- drug tolerance

# Parenteral Routes of Administration

- Parenteral administration is injection or infusion by means of a needle or catheter inserted into the body
- Parenteral forms deserve special attention
  - complexity
  - widespread use
  - potential for therapeutic benefit and danger
- The term *parenteral* comes from Greek words
  - para, meaning outside
  - enteron, meaning the intestine
- This route of administration bypasses the alimentary canal

# Parenteral Dose Forms

- Parenteral preparations must be sterile
  - free of microorganisms
- To ensure sterility, parenterals are prepared using
  - aseptic techniques
  - special clothing (gowns, masks, hair net, gloves)
  - laminar flow hoods placed in special rooms

# Parenteral Dose Forms

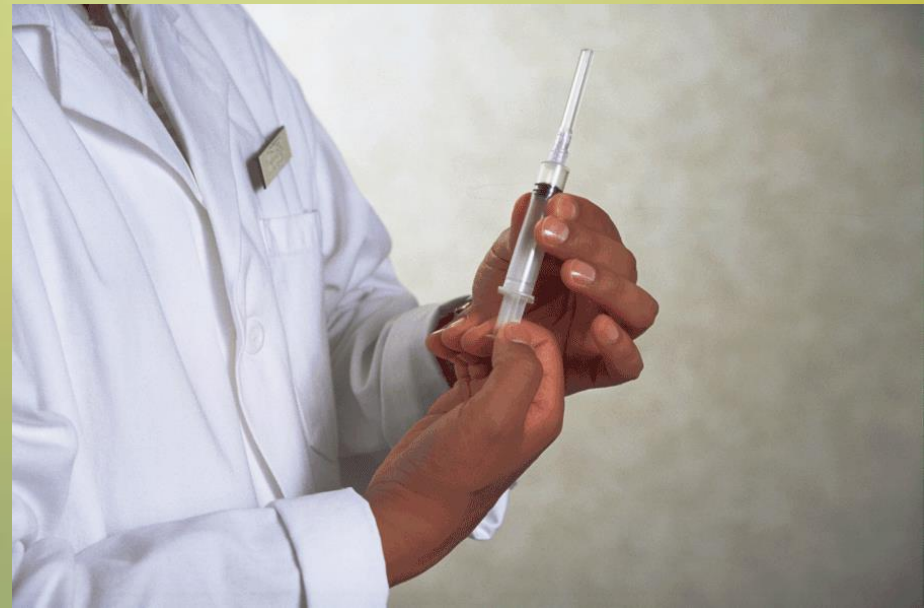
- IV route
  - directly into a vein
- Prepared in hospitals and home healthcare pharmacies
  - antibiotics
  - chemotherapy
  - nutrition
  - critical care medications

# Parenteral Dose Forms

- Intramuscular (IM) injections
  - into a muscle
- Subcutaneous injections
  - under the skin
- Intradermal (ID) injections
  - into the skin

# Parenteral Dose Forms

- Disposable syringes and needles are used to administer drugs by injection
- Different sizes are available depending on the type of medication and injection needed



# Advantages and Disadvantages of the Parenteral Route

- The IV route is the fastest method for delivering systemic drugs
  - preferred administration in an emergency situation
- It can provide fluids, electrolytes, and nutrition
  - patients who cannot take food or have serious problems with the GI tract
- It provides higher concentration of drug to bloodstream or tissues
  - advantageous in serious bacterial infection

# Advantages and Disadvantages of the Parenteral Route

- IV infusion provides a continuous amount of needed medication
  - without fluctuation in blood levels of other routes
- infusion rate can be adjusted
  - to provide more or less medication as the situation dictates



# Advantages and Disadvantages of the Parenteral Route

- Traumatic injury from the insertion of needle
- Potential for introducing:
  - toxic agents
  - microbes
  - pyrogens
- Impossible to retrieve if adverse reaction occurs
  - injected directly into the body

# Advantages and Disadvantages of the Parenteral Route

- Intramuscular (IM) and subcutaneous routes of administration are convenient ways to deliver medications
- Compared with the IV route:
  - onset of response of the medication is slower
  - duration of action is much longer
- Practical for use outside the hospital
- Used for drugs which are not active orally

# Advantages and Disadvantages of the Parenteral Route

- For intramuscular (IM) and subcutaneous routes of administration, the injection site needs to be “prepped”
  - using alcohol wipe
- Correct syringe, needle, and technique must be used
- Rotation of injection sites with long-term use
  - prevents scarring and other skin changes
  - can influence drug absorption

# Parenteral Dose Forms

*Safety*

**Note**

Do not use SQ or SC abbreviations. Instead, write out subcutaneous to minimize potential medication errors.

# Advantages and Disadvantages of the Parenteral Route

- The intradermal (ID) route of administration is used for diagnostic and allergy skin testing
  - patient may experience a severe local reaction if allergic or has prior exposure to a testing antigen

# Dispensing and Administering Parenteral Medications

- Most parenteral preparations are made up of ingredients in a sterile-water medium
  - the body is primarily an aqueous (water-containing) vehicle
- Parenteral preparations are usually:
  - solutions
  - suspensions

# Dispensing and Administering Parenteral Medications

- IV injections and infusions are introduced directly into the bloodstream
  - must be free of air bubbles and particulate matter
  - introduction of air or particles might cause embolism, blockage in a vessel, or severe painful reaction at the injection site

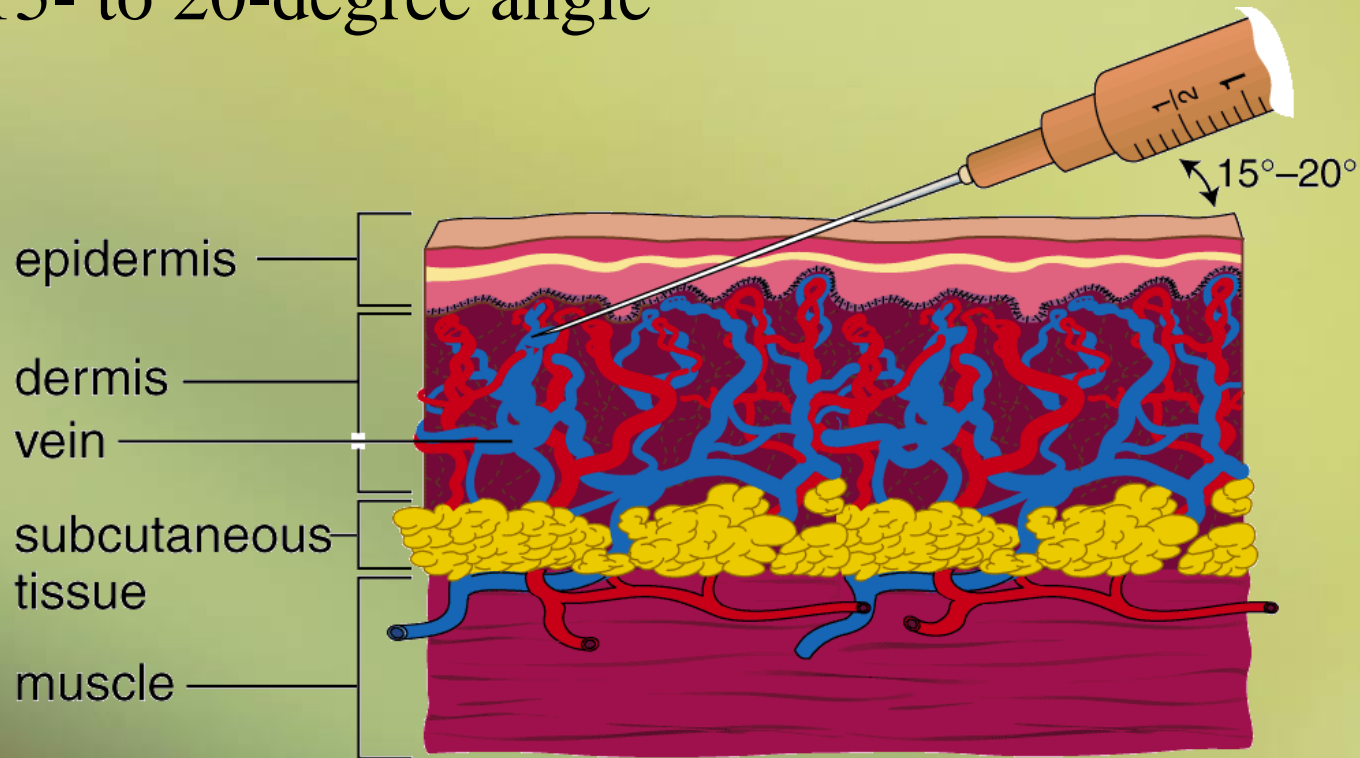
# Intravenous Injections or Infusions

- Fast-acting route because the drug goes directly into the bloodstream
  - often used in the emergency department and in critical care areas
- Commonly used
  - for fluid and electrolyte replacement
  - to provide necessary nutrition to the patient who is critically ill



# Intravenous Injections or Infusions

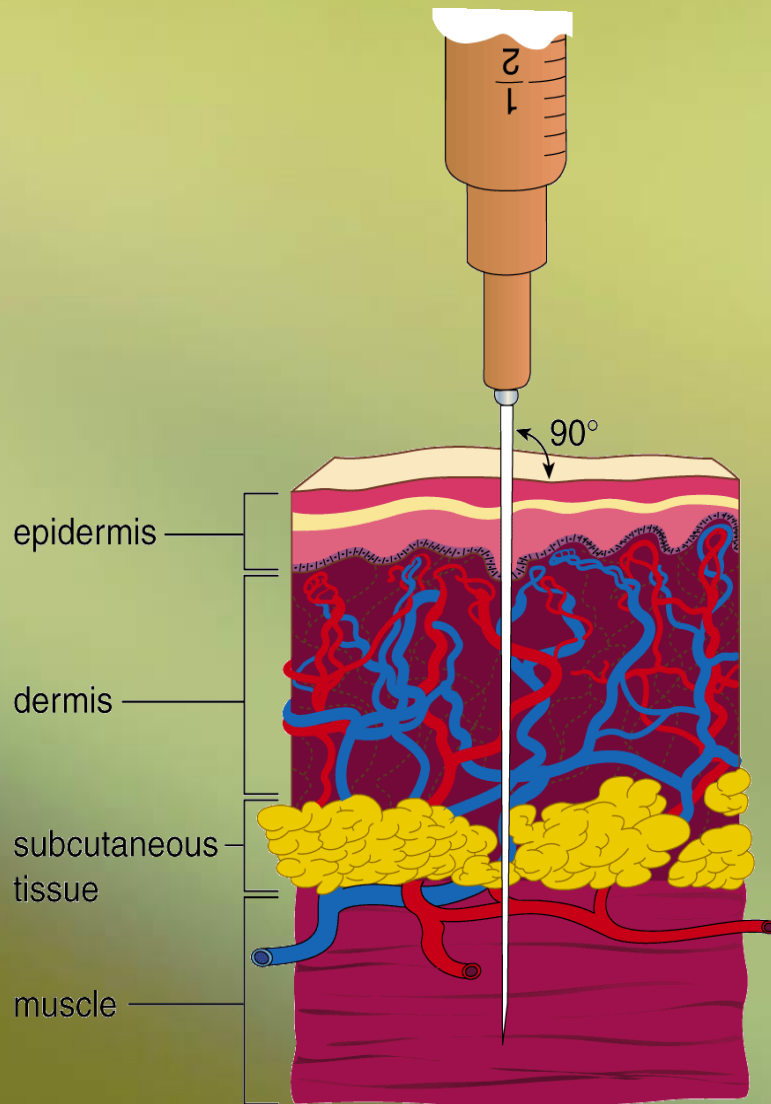
- Intravenous (IV) injections are administered at a 15- to 20-degree angle



# Intramuscular Injections

- Care must be taken with deep IM injections to avoid hitting a vein, artery, or nerve
- In adults, IM injections are given into upper, outer portion of the gluteus maximus
  - large muscle on either side of the buttocks
- For children and some adults, IM injections are given into the deltoid muscles of the shoulders

# Intramuscular Injections



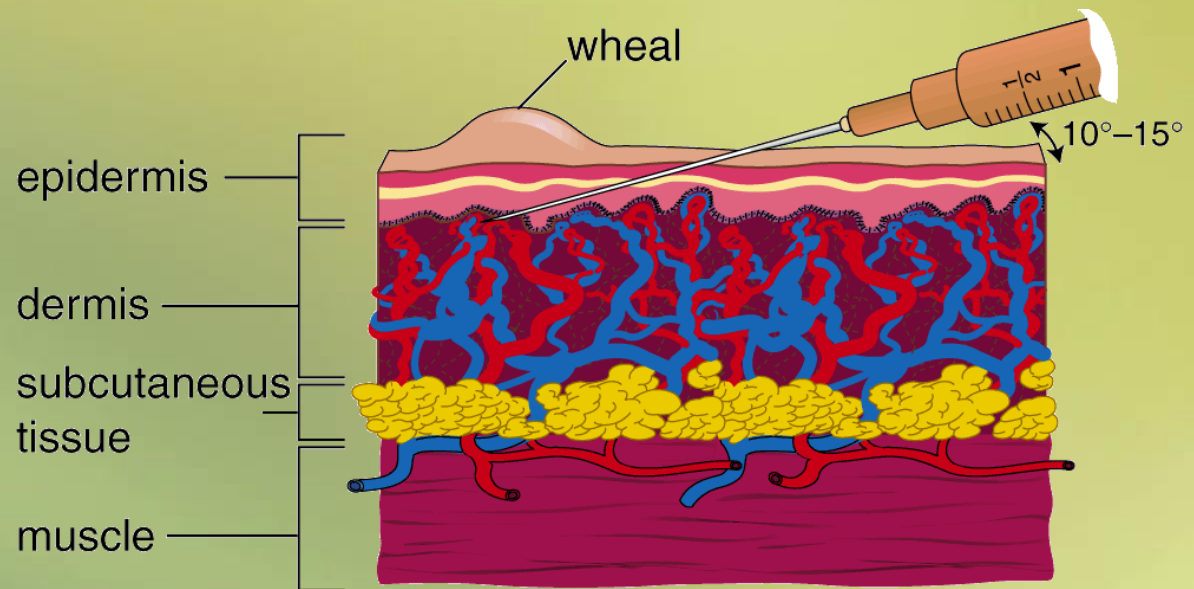
- Typical needle is 22- to 25-gauge ½- to 1-inch needle
- Intramuscular (IM) injections are administered at a 90-degree angle
  - volume limited to less than 3 mL

# Intramuscular Injections

- Used to administer
  - antibiotics
  - vitamins
  - iron
  - vaccines
- Absorption of drug by IM route is unpredictable
  - not recommended for patients who are unconscious or in a shocklike state

# Intradermal Injections

- Given into capillary-rich layer just below epidermis for
  - local anesthesia
  - diagnostic tests
  - immunizations



# Intradermal Injections

- Examples of ID injections include
  - skin test for tuberculosis (TB) or fungal infections
    - typical site is the upper forearm, below the area where IV injections are given
  - allergy skin testing
    - small amounts of various allergens are administered to detect allergies
    - usually on the back

# Subcutaneous Injections

- Administer medications below the skin into the subcutaneous fat
  - outside of the upper arm
  - top of the thigh
  - lower portion of each side of the abdomen
  - not into grossly adipose, hardened, inflamed, or swollen tissue
- Often have a longer onset of action and a longer duration of action
  - compared with IM or IV injection

# Subcutaneous Injections

- Insulin is given using 28- to 30-gauge short needles
  - in special syringe that measures in units
- Insulin is administered following a plan for site rotation
  - to avoid or minimize local skin reactions
- Absorption may vary depending on
  - site of administration
  - activity level of the patient



# Subcutaneous Injections

- Keep insulin refrigerated
- Check expiration dates frequently
  - opened vials should be discarded after one month
- A vial of insulin is agitated and warmed by rolling between the hands and should never be shaken
- The rubber stopper should be wiped with an alcohol wipe

# Subcutaneous Injections

- When administering insulin, air is injected into vial
  - equal to the amount of insulin to be withdrawn
- Air is gently pushed from syringe with the plunger
- Patient should plan meals, exercise, and insulin administration
  - to gain the best advantage of the medication
  - avoid chances of creating hypoglycemia

# Subcutaneous Injections

*Safety*

*Note*

Do not shake insulin.

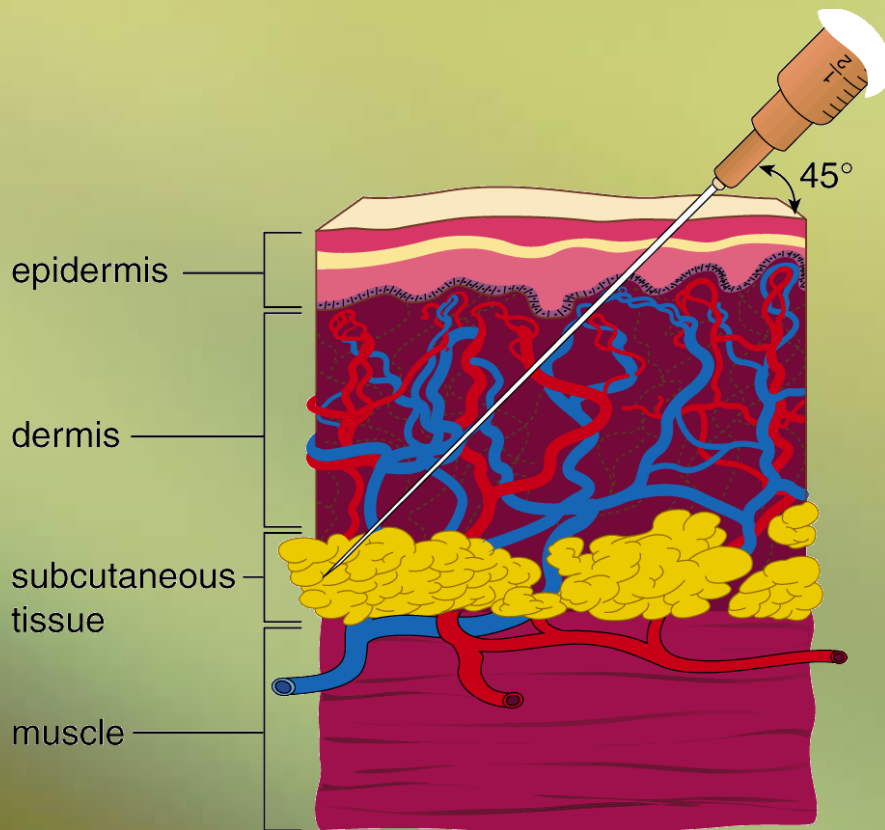
# Subcutaneous Injections

- Medications administered by this route include:
  - epinephrine (or adrenaline)
    - for emergency asthmatic attacks or allergic reactions
  - heparin or low molecular–weight heparins
    - to prevent blood clots
  - sumatriptan or Imitrex
    - for migraines
  - many vaccines

# Subcutaneous Injections

- Normally given with the syringe held at a 45-degree angle
  - in lean older patients with less tissue and obese patients with more tissue, the syringe should be held at more of a 90-degree angle
- Correct length of needle is determined by a skin pinch in the injection area
  - proper length is one half the thickness of the pinch

# Subcutaneous Injections



- Given at a 45-degree angle
  - 25- or 26-gauge needle, 3/8 to 5/8 inch length
- No more than 1.5 mL should be injected into the site
  - to avoid pressure on sensory nerves causing pain and discomfort

