

Date:

PRACTICAL 7

COMPETENCY

PH1.5: Describe various routes of drug administration, their advantages and disadvantages and demonstrate administration of, e.g. SC, IV, IM, SL, rectal, spinal, sublingual, intranasal sprays and inhalers.

Objectives

At the end of this practical class, student should be able to:

- Describe precautions during administration of drug through various routes.
- Explain withdrawal of drug from vial and ampoule.
- Demonstrate the important steps in administration of injections by intradermal, subcutaneous, intramuscular and intravenous routes in mannequins.
- Demonstrate method of administration of parenteral infusions.

Domain: Knowledge, skill, affective and communication

Level: Knows how, shows how

Teaching learning methods: Small group teaching, DOAP, role plays/Simulations (mannequins, hybrid, computer)

Aligning assessment methods: Written/viva voce/tutorial/OSPE/direct observation

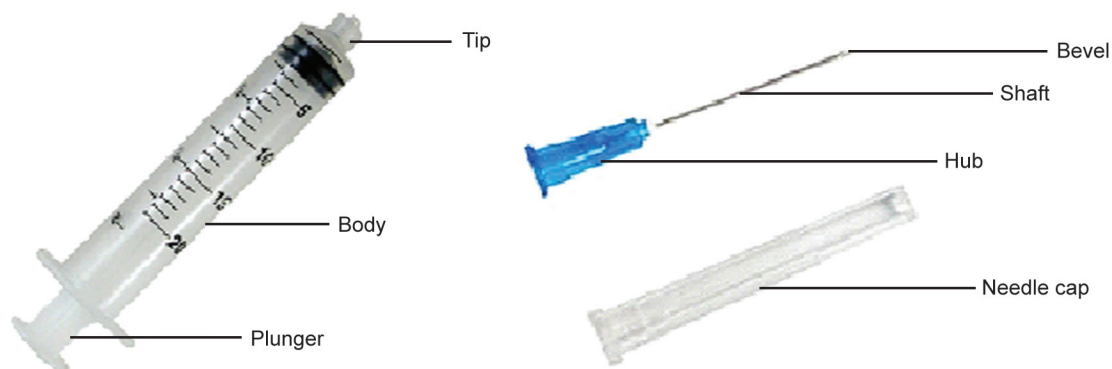
Number of procedure to be done independently for certification: 02

Materials needed: Syringe, drug to be administered, needle (as per the route), liquid disinfectant, cotton wool, adhesive tape, tourniquet and mannequin/simulator.

There are various routes through which drugs are administered in our body. Many routes do not require assistance like oral, sublingual route, etc. but parenteral route requires various aseptic precautions and assistance. For administration of drugs; syringes and needles (as per route) are required in parenteral routes. These are also required to withdraw secretions from the body.

Syringes

Syringes are available in the capacity of 1–50 ml and have graduation marks on the barrel. Special insulin syringe have graduation marks in units. They are made up of plastic or glass. The glass syringe can be reused after sterilization. Plastic syringes are disposable and are commonly used with disposable needles. Prefilled syringes are meant for single administration. Example typhoid vaccine, anti-D immunoglobulin, etc.



Needles

The needles are made up of metal and consist of hub which locks to the syringe tip. They are available in different sizes as per the length and the outer diameter of the shaft (gauge). Needles are almost always disposable. The diameter varies from 13 gauge (thickest) to 27 gauge (finest). The thick or large bore needles are used for thick or oily liquids. For example, benzathine penicillin.



The commonly used parenteral routes with needles sizes are shown below:

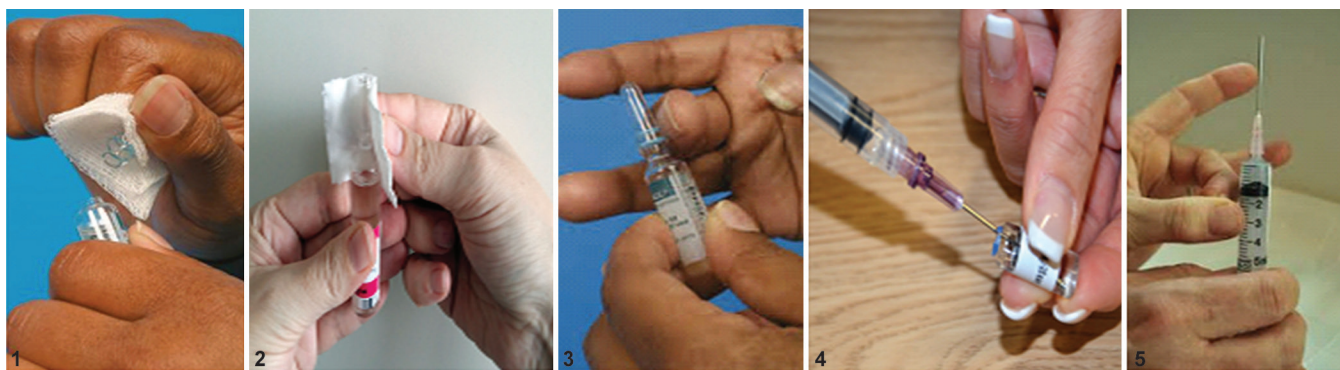
Route	Gauge	Syringe	Site of injection
Intradermal	24–26	Tuberculin syringe	Anteromedial surface of forearm
Subcutaneous	24–25	Tuberculin or Insulin syringe	Loose subcutaneous tissue of skin, outer surface of arm, Front of thigh
Intramuscular	20–24	2–5 ml	Deep between muscle mass, deltoid, dorsogluteal, ventrogluteal (adults), lateral femoral (children)
Intravenous	18–22	Intracatheter	Anterior cubital vein, other veins at the elbow
Intracardiac	14–16	10 ml	Through 4th intercostal space into the chamber of the ventricle
Intra-articular	18–19	10 ml	Joint space

Precautions to be Taken while Administering an Injection

1. Observe aseptic precautions.
2. Clean site of injection with germicidal solution.
3. Use sterile equipment.
4. Apply proper technique to minimize pain and chances of injury to the nerves and vessels.
5. Select the appropriate size of syringe and needle.
6. Syringe and needle should be empty before use.
7. Always check the label including expiry date of drug.
8. Disinfect the tip and rubber cap of vial.
9. Mix only compatible drugs.
10. Never return unused drug to stock bottle.
11. Avoid needle prick injury.
12. Destroy needle and syringe safely. Do not reuse disposable syringes and needles.
13. Do not touch anything with needle once its protective cover is removed.
14. Do not prick yourself or anyone other with the used needle.
15. Press sterile cotton onto the opening. Fix with adhesive tape.

Withdrawal of Drug from Ampoule

1. Put needle on syringe, without touching their tips.
2. Remove liquid from the neck of the ampoule by flicking it or swinging it fast in a downward spiraling movement.
3. Protect your fingers with gauze, if ampoule is made of glass.
4. Break the neck of ampoule and split it off.
5. Aspirate drug from ampoule.
6. Remove air from the syringe.



Withdrawal of Drug from Vial

1. Disinfect the rubber cap of vial.
2. Use syringe with volume twice the amount of solution required.
3. Place needle on syringe, without touching their tips.
4. Suck as much air into the syringe as the volume of solution to be injected.
5. Insert needle into the top of vial.
6. Turn it upside down.
7. Pump air into vial.
8. Withdraw appropriate amount of drug.

Dissolving a Drug in a Medium

1. Insert needle with syringe containing medium into vial.
2. Hold it in upright position.
3. Inject fluid into vial and turn it upside down.
4. Shake the vial well.

Technique for Intradermal Injection (id)

1. Observe aseptic precautions.
2. Reassure the patient and explain the procedure.
3. Uncover the area to be injected (inner surface of the forearm and the upper back) and disinfect skin with germicidal solution like spirit.
4. Pinch the skin. Insert needle intradermally at an angle of 5–15 degrees and release skin.
5. Inject slowly (0.5–2 minutes).
6. Bleb formation will occur.
7. Withdraw the needle swiftly.



Technique for Subcutaneous Injection (SC)

1. Observe aseptic precautions.
2. Reassure the patient and explain the procedure.
3. Uncover the area to be injected (upper arm, upper leg, and abdomen) and disinfect skin.
4. Pinch and fold the skin. Insert needle in the base of the skin fold at an angle of 30–45 degrees and release skin.
5. Aspirate briefly; if blood appears, withdraw needle, replace it with new one, if possible and start again from disinfecting the skin.
6. Inject slowly (0.5–2 minutes)
7. Withdraw needle quickly.



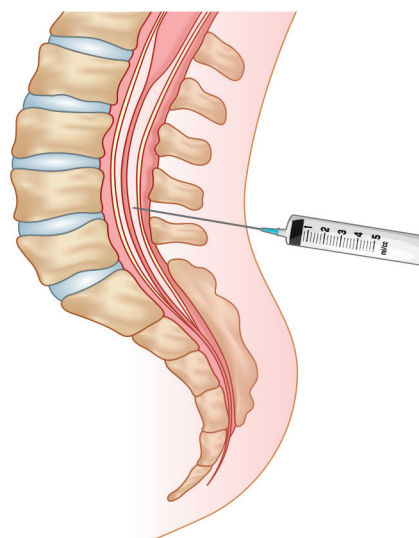
Technique for Intramuscular Injection

1. Observe aseptic precautions.
2. Reassure the patient and explain the procedure.
3. Uncover the area to be injected (lateral upper quadrant major gluteal muscle, lateral side of upper leg, deltoid muscle) and disinfect.
4. Ask patient to relax the muscle.
5. Insert needle at an angle of 90 degrees. Watch depth.
6. Aspirate briefly; if blood appears, withdraw needle, replace it with new one, if possible and start again from disinfecting the skin.
7. Inject slowly (0.5–2 minutes).
8. Withdraw the needle swiftly.



Technique for Spinal Injection

1. Observe aseptic precautions.
2. Reassure the patient and explain the procedure.
3. Patient is given a proper position—sitting or lateral.
4. Insert the spinal needle in L3–L4 or L4–L5 interspace.
5. Once the needle is in its appropriate space, remove stylet and cerebrospinal fluid can be seen at the needle hub.
6. Once confirmed, inject the local anaesthetic drug alone or with adjuvant slowly.
7. Needle is then removed carefully and discarded.
8. Patient should be laid in lateral tilt position and allowed to stabilize.
9. Continuous monitoring of vitals required.
10. Surgical procedure can be commenced once anaesthetic effects have kicked in.



Technique for Intravenous Injection

1. Observe aseptic precautions.
2. Reassure the patient and explain the procedure.
3. Uncover the arm completely.
4. Ask the patient relax and support his arm below the vein to be used. Apply tourniquet and look for suitable vein. Wait for the vein to swell.
5. Stabilize the vein by pulling the skin taut in the longitudinal direction of the vein. Do this with the hand you are not using for inserting the needle.
6. Insert needle at an angle of 35 degrees.
7. Puncture skin and move needle slightly into the vein (3–5 mm).
8. Hold the syringe and needle steady.
9. Aspirate; if blood appears, hold the syringe steadily as you are in the vein. If it does not come, try again.
10. Loosen tourniquet.
11. Inject very slowly.



Equipment for Administering an Intravenous Infusion

- a. IV cannula
- b. IV infusion set—it consists of following parts:
 1. Insertion spike—it is used to be fixed in the IV fluid bottle.
 2. Plastic tubing—it is for passage of fluids.
 3. Drip chamber (Murphy's chamber) with filter (for blood transfusion) or without filter—It is used to fix the drop rate.
 4. Control clamp or roller—it is used to control rate of flow.
 5. Latex tube—it is used for injecting additional drugs.
 6. Needle adapter—it is to be introduced inside the needle.

Method of Administration of Intravenous Infusions

1. Select a proper vein and make it prominent by applying a tourniquet.
2. Pull the skin in longitudinal direction of vein.
3. Insert the cannula at an angle of 35 degrees.
4. Puncture the skin, move the needle horizontally in vein.
5. Slowly remove the stylet of cannula.
6. Loosen the tourniquet.
7. Secure the cannula with adhesive tape.
8. Connect cannula to IV set through needle adapter.
9. Adjust the flow rate as required.

LET'S DO THIS

1. What is angle at which needle should be inserted in case of intramuscular injection and intradermal injection?

2. Identify the picture. Write its one advantage.



3. What are the steps for withdrawal the drug from ampoule?

4. Identify route of drug administration in this picture and write two drugs given by this route.



5. Match the following.

Needle Gauge	Route
26	IV
24	IM
18	ID
20	Intra-articular

6. Inject 1 ml of drug intramuscularly in a given simulator. (Assessment by checklist of steps)

