**Intramuscular and Subcutaneous Injections**

**Intramuscular Injections**

Intramuscular injection (IM) is injection of medication into the muscle through the dermis, epidermis and subcutaneous layers.

- Used for medications that are soluble, used in small amounts and do not irritate soft tissues.
- Medications that can be administered via this route, include:
  - Vaccines
  - Antibiotics
  - Antiemetics
  - Analgesics
  - Sedatives
- As muscles are well perfused, there is a rapid systemic action, although it is slower than medication injected intravenously.
- The volume of medication that can be administered depends upon the size of the muscle bed - 5mls into large muscles, 1-2mls into smaller muscles.

![Figure 1](image.png)

**Figure 1**: Demonstrating a standard set up in a clinical skills laboratory for carrying out an intramuscular injection.
Sites for Intramuscular Injections

The choice of site depends upon:

1. The patient’s general physical status and age
2. The amount of medication to be given.

The five main injection sites are as follows:

1. **Upper arm (Deltoid).** This site is the most accessible site. However, it is only suitable for relatively small amounts of solution.
   
   Typical volume of medication 1 - 2ml
   
   **Location** – the muscle is located in the upper arm approximately 2.5 to 5 cm below the lower edge of the acromion process. The needle is inserted 2.5 cm below the acromion process on the lateral aspect of the arm. The muscle will relax if the patient is asked to put their hand on their hip, like a model.

2. **Upper outer quadrant of buttock. (Dorsogluteal site)** This is the most popular site for deep intramuscular injections, as it is a fairly large muscle it can withstand large and repeated injections. However the gluteus muscle does have the lowest drug absorption rate. It is vital that this area is correctly identified as the sciatic nerve and the superior gluteal artery lie in the medial part of the buttock. These structures can be damaged especially in elderly, emaciated or a non-ambulant patient as the muscle mass is likely to have atrophied. In mildly obese patients, injection into this area is likely to be into the adipose tissue rather than the muscle, therefore resulting in slow absorption of the medication.
   
   Typical volume of medication 2 - 4ml
   
   **Location** – An imaginary line is drawn horizontally across from the top of the cleft of the buttocks to the greater trochanter of the femur. Another line is then drawn vertically midway along the first line. The upper outer quarter or quadrant is used.
3. **Lateral aspect of the thigh (Vastus lateralis).** This is also a large muscle and is used for deep intramuscular injections. It is easy to access, especially if the patient is unable to turn on to their side. There are no major blood vessels or significant nerve structures associated with this site. Care should be taken in obese patients that the drug is delivered into the muscle and not the subcutaneous fat.

Typical volume of medication 1 - 5ml

**Location** – In an adult, it is found by measuring a hand’s breadth down from the greater trochanter of the femur and a hand’s breadth up from the knee on the lateral side of the thigh - this identifies the middle third of the muscle.

4. **Anterior aspect of the thigh (rectus femoris).** As this site is easily accessible to the patient, it can be used for self-administration of injections and is also used in infants. Can be used for administration of narcotics, antiemetics, sedatives and deep intramuscular injections.

Typical volume of medication 1 - 5ml

**Location** - Middle third of the anterior thigh.

5. **The ventogluteal site (gluteus medius).** This is an alternative site to the dorsogluteal site. It avoids all major nerves and blood vessels. Can be used for administration of narcotics, antiemetics, sedatives and deep intramuscular injections.

Typical volume of medication 1 - 4ml

**Location** – Palm of hand placed onto patient’s greater trochanter. The index finger is extended to touch the anterior superior iliac crest and the middle finger is stretched as far as possible along the iliac crest to form a V. The needle should be inserted into the middle of the V.
Skin Preparation

There are many variations in this but **local Trust policies must be adhered to.**

- In some Trust’s, if the patient is physically clean and the practitioner maintains high standards of hand hygiene and asepsis during the procedure, skin cleansing prior to intramuscular injection is considered not necessary.
- When indicated, the skin should be thoroughly cleaned (for 30 seconds) with a 70% isopropyl alcohol swab and allowed to dry completely.
- Immunosuppressed patients should always have their skin cleaned because infection can be caused by a relatively small number of pathogens.
- **Note: It is the responsibility of the person administering the drug to check the local hospital policy for cleaning the skin prior to injection.**

Equipment

1. The patient's drug chart and wrist label.
2. A clean receptacle in which to place the equipment.
3. Alcohol handwash.
5. The drug (and diluent if required).
6. An appropriate sized syringe.
7. Two hypodermic needles of an appropriate size and length. One to draw up the medication and the other to penetrate the muscle and administer the medication.
8. 70% isopropyl alcohol swab to clean the skin.
9. A sharps disposal bin

Intramuscular needles

- The needle must be long enough to penetrate the muscle and still allow a third to a quarter of the needle to remain external to the skin.
- Most commonly used sizes are – 21g (green) or 23g (blue) and are 2.5 – 5 cm long.
- The muscle mass, amount of subcutaneous fat and the weight of the patient should be assessed before deciding what size needle to use.
Intramuscular injections – Procedure (Dorsogluteal site)

Initiating the procedure – these include

- Wash hands according to recommended guidelines.
- Introduce yourself by full name and post.
- Identify the patient by asking them to state their name, date of birth and first line of address and check all information against patient identification wrist band. This is done to ensure that the injection is given to the right patient
- Explain the procedure to the patient and gain the patient’s consent. Receiving an IM injection can be a painful procedure and the patient should be warned about the possibility of pain.
- Check the name, dose, route and expiry date of the drug to be administered against the patient’s drug chart.
- Check for any known drug allergies or adverse drug reactions in the past. Ensure that the patient does not have an allergy to the prescribed medication.

Performance of task

Preparing the medication

- Collect the required equipment
- Wash hands and put on gloves and apron. This will help reducing the risk of contamination and also protect you.
- Prepare the drug for administration in the designated area—(usually a clinical room). It may be necessary to check the medication with another healthcare professional to make sure the right drug is being given.
- Once medication is drawn up into the syringe from the ampoule, expel any air from the syringe. Discard used needle into sharps bin and apply a new sheathed needle (either 21g or 23g). Changing the needle avoids trauma to the patient if the needle is barbed and also avoids tracking of medication through superficial tissues when administered.
- Remove gloves.
Administering the intramuscular injection

- Approach the patient, close the door or draw curtains to maintain patient's privacy and dignity.
- Wash hands and don gloves.
- Raise the bed to a comfortable working height. Ensure patient safety rails are raised up. This will prevent the patient from falling from the bed.
- Ask the patient to turn into the lateral position. If the patient struggle on their own to turn, help the patient utilising safe manual handling techniques, so that the patient assumes the correct position.
- Identify the upper outer quadrant of the buttock by dividing the buttock into quarters using the greater trochanter of femur as the landmark.
- Assess the site for signs of inflammation, oedema, infection and skin lesions.
- Clean the skin as per local policy and allow to the skin to dry completely. The patient may feel a stinging sensation if any alcohol is enters into the tissues.
- Stretch the skin around the injection site with thumb and forefinger. Hold the needle and syringe at 90º to the skin surface and quickly but gently plunge into the skin (Figure 2)
- Leave a third of the needle length visible. This is done in case the needle breaks, it can still be removed (Figure 3).
- Pull back the plunger, if blood is seen, remove the needle and syringe and apply pressure to the site until haemostasis has been achieved. Start again with a fresh set of equipment.
- If no blood is seen, then inject the drug slowly (approx 1ml/5-10 seconds).
- Remove needle and apply pressure. Applying pressure may help preventing haematoma formation.
- Dispose of the needle and syringe into a sharps bin.
- Record the administration of the drug on the prescription sheet and check patient's welfare.
Figure 2: Hold the needle and syringe at 90° to the skin surface prior to plunging into the skin in a quick yet gentle manner.

Figure 3: Leave a third of the needle length visible and inject the medication.
Aftercare

- Monitor your patient and look for any localised signs such as redness, bleeding, swelling or pain.

- Observe the patient for a minimum of 15 minutes following an injection for any signs of a drug reaction.

Complications of intramuscular injections

- Local infection and abscess formation may occur when poor sterile techniques are used.

- When injecting in the gluteal region sciatic nerve injury can occur if the right area is not used.

- Repeated injections at the same site may result in local fibrosis.

- The majority of complications following an IM injection are related to the drug injected.

- Pain or discomfort may occur following an injection but should resolve uneventfully.

A video demonstrating Intramuscular injection is available on the Clinical Skills Homepage on Minerva. Kindly view the video prior to attending the teaching session.

References

Subcutaneous Injections

- Subcutaneous injection (SC) is the administration of medication into the fatty vascular layer below the dermis.
- This route of administration allows a slow, sustained absorption of the drug as there is less blood flow to fatty tissue.
- Medications must be highly soluble to prevent irritation of the soft tissues.
- Medications that can be administered via this route, include:
  - Low molecular weight heparin
  - Insulin
- The maximum volume of medication given via injection = 2ml.

Sites for Subcutaneous Injections

- Abdomen – in the umbilical region
- Lateral or posterior aspect of the lower part of the upper arm
- Thighs (under the greater trochanter rather than mid-thigh)
- Buttocks

- Different patients have different amounts of subcutaneous tissue. When selecting needle length it is important to observe the amount of subcutaneous tissue present e.g. patients who are anorexic or wasted due to underlying disease will have a fairly thin layer of fat.
- Patients who are athletic and very fit may also have limited amounts of subcutaneous fat available for SC injections.
- Diabetic patients are advised to rotate their injection sites as this can decrease the likelihood of irritation and ensure that the insulin is absorbed adequately.
Skin Preparation
There are many variations in this but local Trust policies must be adhered to.

- Swabbing the skin with alcohol prior to insulin injections can cause the skin to become hardened.

Equipment
1. The patient’s drug chart and wrist label.
2. A clean receptacle to put the equipment in.
3. Alcohol handwash.
5. The drug (and diluent if required).
6. An appropriate sized syringe.
7. Two hypodermic needles of an appropriate size. One to draw up the medication, (if necessary), the other to administer the drug using a 25mm - 25 gauge (orange) needle.
8. A sharps bin

Note: Shorter needles are now available including 16 mm and 12mm needles.
Subcutaneous Injections – the procedure

Initiating the procedure – these include

- Wash hands according to recommended guidelines.
- Introduce yourself by full name and post.
- Identify the patient by asking them to state their name, date of birth and first line of address and check all information against patient identification wrist band. This is done to ensure that the injection is given to the right patient.
- Explain the procedure to the patient and gain the patient’s consent.
- Check the name, dose, route and expiry date of the drug to be administered against the patient’s drug chart.
- Check for any known drug allergies or adverse drug reactions in the past. Ensure that the patient does not have an allergy to the prescribed medication.

Performance of task

Preparing the medication

- Collect the required equipment.
- Wash hands and put on gloves and apron. This will help reducing the risk of contamination and also protect you.
- Prepare the drug for administration in the designated area—(usually a clinical room). It may be necessary to check the medication with another healthcare professional to make sure the right drug is being given.
- Once medication is drawn up into the syringe from the ampoule, expel any air from the syringe. Discard used needle into sharps bin and apply a new sheathed needle (25g). Changing the needle avoids trauma to the patient if the needle is barbed and also avoids tracking of medication through superficial tissues when administered.
- Remove gloves and wash hands.
Administering the subcutaneous injection

- Approach the patient, close the door or draw curtains to maintain patient’s privacy and dignity.
- Wash hands, don gloves and apron.
- Raise the bed to a comfortable working height. Ensure patient safety rails are up. This will prevent the patient from falling from the bed.
- Expose the chosen site and assess the site for signs of inflammation, oedema, infection and skin lesions.
- Clean the skin as per local policy and allow to the skin to dry completely. The patient may feel a stinging sensation if any alcohol is enters into the tissues.
- Gently pinch the skin up into a fold. This action will elevate the subcutaneous tissue and lift it away from the underlying muscle layer.
- Insert the needle into the skin at an angle of 45° (unless the giving insulin which should be at 90°) and release the grasped skin and inject the drug slowly (Figure 1). Shorter needles allow the injections to be given at a ninety degree angle.
- Remove needle and apply pressure. Applying pressure may help preventing haematoma formation.
- Dispose of the needle and syringe into a sharps bin.
- Record the administration of the drug on the prescription sheet and check

Note

- It is the responsibility of the person administering the drug to check the local hospital policy for cleaning the skin prior to injection.
- It is the responsibility of the person administering the drug to check the patient for any adverse reactions.
**Subcutaneous Injection**

*Figure 1:* Gently pinch the skin up into a fold. Insert the needle into the skin at an angle of 45° (unless giving insulin which should be at 90° as a shorter needle is being used)
NOTE: A video demonstrating subcutaneous injection is available on the Clinical Skills Homepage on Minerva. Kindly view the video prior to attending the teaching session.

References
