18.6: Administering Intramuscular Medications

The intramuscular (IM) injection route is used to place medication in muscle tissue. Muscle has an abundant blood supply that allows medications to be absorbed faster than the subcutaneous route.

Factors that influence the choice of muscle to use for an intramuscular injection include the patient’s size, as well as the amount, viscosity, and type of medication. The length of the needle must be long enough to pass through the subcutaneous tissue to reach the muscle, so needles up to 1.5 inches long may be selected. However, if a patient is thin, a shorter needle length is used because there is less fat tissue to advance through to reach the muscle. Additionally, the muscle mass of infants and young children cannot tolerate large amounts of medication volume. Medication fluid amounts up to 0.5-1 mL can be injected in one site in infants and children, whereas adults can tolerate 2-5 mL. Intramuscular injections are administered at a 90-degree angle. Research has found administering medications at 10 seconds per mL is an effective rate for IM injections, but always review the drug administration rate per pharmacy or manufacturer’s recommendations.[1]

Anatomic Sites

Anatomic sites must be selected carefully for intramuscular injections and include the ventrogluteal, vastus lateralis, and the deltoid. The vastus lateralis site is preferred for infants because that muscle is most developed. The ventrogluteal site is generally recommended for IM medication administration in adults, but IM vaccines may be administered in the deltoid site. Additional information regarding injections in each of these sites is provided in the following subsections.

Ventrogluteal

This site involves the gluteus medius and minimus muscle and is the safest injection site for adults and children because
it provides the greatest thickness of gluteal muscles, is free from penetrating nerves and blood vessels, and has a thin layer of fat. To locate the ventrogluteal site, place the patient in a supine or lateral position. Use your right hand for the left hip or your left hand for the right hip. Place the heel or palm of your hand on the greater trochanter, with the thumb pointed toward the belly button. Extend your index finger to the anterior superior iliac spine and spread your middle finger pointing towards the iliac crest. Insert the needle into the “V” formed between your index and middle fingers. This is the preferred site for all oily and irritating solutions for patients of any age.\(^\text{[2]}\) See Figure \(\PageIndex{1}\)\(^\text{[3]}\) for an image demonstrating how to accurately locate the ventrogluteal site using your hand.

The needle gauge used at the ventrogluteal site is determined by the solution of the medication ordered. An aqueous solution can be given with a 20- to 25-gauge needle, whereas viscous or oil-based solutions are given with 18- to 21-gauge needles. The needle length is based on patient weight and body mass index. A thin adult may require a 5/8-inch to 1-inch (16 mm to 25 mm) needle, while an average adult may require a 1-inch (25 mm) needle, and a larger adult (over 70 kg) may require a 1-inch to 1½-inch (25 mm to 38 mm) needle. Children and infants require shorter needles. Refer to agency policies regarding needle length for infants, children, and adolescents. Up to 3 mL of medication may be administered in the ventrogluteal muscle of an average adult and up to 1 mL in children. See Figure \(\PageIndex{2}\)\(^\text{[4]}\) for an image of locating the ventrogluteal site on a patient.
The vastus lateralis site is commonly used for immunizations in infants and toddlers because the muscle is thick and well-developed. This muscle is located on the anterior lateral aspect of the thigh and extends from one hand’s breadth above the knee to one hand’s breadth below the greater trochanter. The outer middle third of the muscle is used for injections. To help relax the patient, ask the patient to lie flat with knees slightly bent or have the patient in a sitting position. See Figure 3 for an image of the vastus lateralis injection site.
The length of the needle used at the vastus lateralis site is based on the patient’s age, weight, and body mass index. In general, the recommended needle length for an adult is 1 inch to 1 ½ inches (25 mm to 38 mm), but the needle length is shorter for children. Refer to agency policy for pediatric needle lengths. The gauge of the needle is determined by the type of medication administered. Aqueous solutions can be given with a 20- to 25-gauge needle; oily or viscous medications should be administered with 18- to 21-gauge needles. A smaller gauge needle (22 to 25 gauge) should be used with children. The maximum amount of medication for a single injection in an adult is 3 mL. See Figure \ref{PageIndex{4}} for an image of an intramuscular injection being administered at the vastus lateralis site.
Deltoid

The **deltoid** muscle has a triangular shape and is easy to locate and access. To locate the injection site, begin by having the patient relax their arm. The patient can be standing, sitting, or lying down. To locate the landmark for the deltoid muscle, expose the upper arm and find the acromion process by palpating the bony prominence. The injection site is in the middle of the deltoid muscle, about 1 inch to 2 inches (2.5 cm to 5 cm) below the acromion process. To locate this area, lay three fingers across the deltoid muscle and below the acromion process. The injection site is generally three finger widths below in the middle of the muscle. See Figure \(\PageIndex{5}\)[7] for an illustration for locating the deltoid injection site.
Select the needle length based on the patient’s age, weight, and body mass. In general, for an adult male weighing 60 kg to 118 kg (130 to 260 lbs), a 1-inch (25 mm) needle is sufficient. For women under 60 kg (130 lbs), a ⅝-inch (16 mm) needle is sufficient, while for women between 60 kg and 90 kg (130 to 200 lbs) a 1-inch (25 mm) needle is required. A 1 ½-inch (38 mm) length needle may be required for women over 90 kg (200 lbs) for a deltoid IM injection. For immunizations, a 22- to 25-gauge needle should be used. Refer to agency policy regarding specifications for infants, children, adolescents, and immunizations. The maximum amount of medication for a single injection is generally 1 mL. See Figure \(\PageIndex{6}\) for an image of locating the deltoid injection site on a patient.
Description of Procedure

When administering an intramuscular injection, the procedure is similar to a subcutaneous injection, but instead of pinching the skin, stabilize the skin around the injection site with your nondominant hand. With your dominant hand, hold the syringe like a dart and inject the needle quickly into the muscle at a 90-degree angle using a steady and smooth motion. After the needle pierces the skin, use the thumb and forefinger of the nondominant hand to hold the syringe. If aspiration is indicated according to agency policy and manufacturer recommendations, pull the plunger back to aspirate for blood. If no blood appears, inject the medication slowly and steadily. If blood appears, discard the syringe and needle and prepare the medication again. See Figure 6 for an image of aspirating for blood. After the medication is completely injected, remove the needle using a smooth, steady motion. Remove the needle at the same angle at which it was inserted. Cover the injection site with sterile gauze using gentle pressure and apply a Band-Aid if needed.

Because the injection sites recommended for immunizations do not contain large blood vessels, the CDC recommends there is no longer the need to aspirate when administering vaccines.
Evidence-based practice supports using the **Z-track method** for administration of intramuscular injections. This method prevents the medication from leaking into the subcutaneous tissue, allows the medication to stay in the muscles, and can minimize irritation.\(^{[12]}\)

The Z-track method creates a zigzag path to prevent medication from leaking into the subcutaneous tissue. This method may be used for all injections or may be specified by the medication.

Displace the patient's skin in a Z-track manner by pulling the skin down or to one side about 1 inch (2 cm) with your nondominant hand before administering the injection. With the skin held to one side, quickly insert the needle at a 90-degree angle. After the needle pierces the skin, continue pulling on the skin with the nondominant hand, and at the same time, grasp the lower end of the syringe barrel with the fingers of the nondominant hand to stabilize it. Move your dominant hand and pull the end of the plunger to aspirate for blood, if indicated. If no blood appears, inject the medication slowly. Once the medication is given, leave the needle in place for ten seconds. After the medication is completely injected, remove the needle using a smooth, steady motion, and then release the skin. See Figure \(\PageIndex{8}\)\(^{[13]}\) for an illustration of the Z-track method.

Special Considerations for IM Injections

- Avoid using sites with atrophied muscle because they will poorly absorb medications.
- If repeated IM injections are given, sites should be rotated to decrease the risk of hypertrophy.
- Older adults and thin patients may only tolerate up to 2 milliliters in a single injection.
• Choose a site that is free from pain, infection, abrasions, or necrosis.
• The dorsogluteal site should be avoided for intramuscular injections because of the risk for injury. If the needle inadvertently hits the sciatic nerve, the patient may experience partial or permanent paralysis of the leg.

Video Reviews of Administering Intramuscular Injections:

Z-Track Method

IM injection Ventrogluteal Site
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15. RegisteredNurseRN. (2014, August 8). How to give an IM intramuscular injection ventrogluteal buttock muscle. [Video]. YouTube. All rights reserved. Video used with permission. https://youtu.be/wKCPIsnYqwA.