

Science Education Collection

# Preparing and Administering Intramuscular Injections

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## Overview

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Intramuscular (IM) injections deposit medications deep into the muscle tissue. Since muscle fibers are well perfused, this route of administration provides quick uptake of the medication and allows for the administration of relatively large volumes. Skeletal muscles have fewer pain-sensing nerves than subcutaneous tissue, which allows for the less painful administration of irritating drugs (e.g., chlorpromazine, an anti-psychotic). IM injections are recommended for patients unable to take oral medications and for uncooperative patients. Some examples of medications that are commonly delivered by IM injections include antibiotics, hormones, and vaccinations.

As in any other route of administration, the nurse must consider if the medication is appropriate, given the patient's medical conditions, allergies, and current clinical status. In addition, specifically for IM injections, it is important to assess the patient's muscle mass to determine the appropriate needle size. Also, if the patient has already received this injection, it is necessary to verify the injection site that was previously used and to ensure that the previous dose did not result in any adverse reactions.

The sites that are most commonly utilized for IM injections include the deltoid muscle of the shoulder; the vastus lateralis of the thigh; and the ventrogluteal, gluteus medius, or dorsogluteal muscles of the hip. It is best to avoid administering IM injections into the dorsogluteal muscle, because this location is associated with an increased risk of hitting a blood vessel, nerve, or bone.

This video will focus on the essential steps that every nurse should follow in order to correctly prepare and administer an IM injection.

## Procedure

**1. Similar to any other route of administration, preparing and administering IM medications requires the nurse to be knowledgeable about the patient's medical history, medication allergies, and preferences, as well as on the previous administration times, adverse effects, and purpose of the medication. All this information can be obtained through discussion with the patient and by reviewing the Medication Administration Record (MAR) at the patient bedside.**

**2. In the case of IM injections, you should be particularly aware of the patient's preference for an injection site and administration process (i.e., whether the patient prefers a particular site and whether he/she prefers you to count down to administration or to swiftly administer the medication).**

**3. Select the most appropriate site for IM injection depending, upon the type of medication being delivered.**

1. Injections sites in the hip area, such as the gluteal muscles, are preferred for the administration of larger volumes of medications, while small volumes can be given to the arm, in the deltoid muscle. The deltoid site is mostly commonly used for immunizations. However, up to 1 mL of any medication may be administered to this muscle (the maximum volume should never exceed 2 mL). The gluteal site is commonly used to administer antibiotics, or any medication with a volume exceeding 2 mL but less than 3 mL for an adult. Many providers consider the ventrogluteal muscle to be the preferred site for IM injections, due to the large muscle mass and the increased absorption when volumes larger than 2 mL are injected in the area.
2. Infants should receive all IM medications in the vastus lateralis because it is the largest muscle at that developmental age.
3. Avoid administering IM injections into the dorsogluteal muscle, because this location is associated with an increased risk of hitting a blood vessel, nerve, or bone.

**4. Adherence to the five "rights"-right patient, right medication, right dose, right route, right time-at the three checkpoints of the safe medication administration process is imperative to prevent patient injury and harm. To learn about these five "rights" in detail, please refer to the video entitled "Safety Checks for Acquiring Medications from a Medication**

**Dispensing Device." Remember to wash or sanitize your hands before and after each patient encounter. Vigorous friction for at least 20 s should be applied while washing the hands with soap and warm water or while applying hand sanitizer.**

**5. Upon entering the medication preparation area (this area may be in a secured room or in a secured portion of the nurses' station), complete the first safety check of the five "rights" of medication administration. Refer to the "Safety Checks for Acquiring Medications from a Medication Dispensing Device" video.**

#### Preparing the IM injection

IM injection preparations are commonly provided in vials or ampules for withdrawal to a syringe. Before withdrawing, it is important that a nurse calculates the volume of the medication to be administered, according to the concentration provided on the container.

**6. In the medication preparation area, prepare the IM injection according to the MAR, nurse drug guide, best practices, and institutional policies/procedures. Remove the medication from the box and removing the vial top.**

1. Scrub the medication vial with an alcohol prep pad for 20 s, with friction and intent, while watching a wall clock or watch.
2. Using aseptic technique, attach a blunt-tipped needle to a syringe, remove the cap, and withdraw the appropriate amount of medication for injection. Note the viscosity of the liquid while withdrawing the medication from the vial. This will help to determine the size of needle needed for the injection.
  1. Hold the vial at eye-level and the needle tip below the level of medication to ensure that the correct amount of liquid is withdrawn and that air bubbles are avoided.
3. If at any time during medication withdrawal, the needle hub, needle cap, or syringe connection point is contaminated from contact with the hands or countertop, obtain new supplies and restart the medication preparation procedure.
4. Engage the blunt-tipped needle safety device or replace the cap using the scoop method (*i.e.*, placing the needle cup on a flat surface and sliding the needle into it) to avoid accidental needle sticks. Discard the blunt-tipped needle in an approved sharps container. Maintain the sterility of the syringe containing the medication.
5. Attach an appropriately sized needle for IM injection to the syringe using aseptic technique. The gauge of the needle should be between 18 and 25 and the length between 5/8 and 1½ inches. Needle selection is dependent upon the age of the patient, administration site, volume of fluid, amount of muscle and adipose tissue, and viscosity of the solution.
  1. Large-bore needles (18 and 20 gauge) are appropriate for thick, viscous medications, while small-bore needles (22 and 25 gauge) are appropriate for thinner medications and for infants.
  2. Long needles (1 and 1½ inches) are most often used for patients with large amounts of adipose tissue covering the muscle site, in order to reach the muscle tissue, or for deep muscles, such as the ventrogluteal muscle. Shorter needle lengths (5/8 and ½ inch) are appropriate for thin patients and for pediatric patients to avoid needle sticks into bone.
  3. If injecting medication into the deltoid muscle of an adult, the volume of solution should not exceed 1 mL.
  4. If injecting into the vastus lateralis, ventrogluteal, gluteus medius, or dorsogluteal muscles of an adult, the volume should not exceed 3 mL.
  5. If administering an IM injection into a child under age 2, the maximum amount that should be administered is 1 mL.
  6. Label the syringe with the medication name and dosage amount and then discard the packaging materials in a trash receptacle. Note that some institutions may require more information, depending upon to their medication labeling policies.

**7. In the medication preparation area, complete the second safety check using the five "rights" of medication administration. Refer to the "Safety Checks for Acquiring Medications from a Medication Dispensing Device" video.**

**8. In addition to the medication to be administered, be sure to obtain all supplies needed for injection before entering the patient's room. These include an alcohol prep wipe, non-sterile gloves, and an adhesive bandage or a cotton ball and silk/paper tape.**

#### Administration

**9. Wash hands when entering the patient room and complete the third and final medication safety check, adhering to the five "rights" of medication administration. Refer to the "Preparing and Administering Oral and Liquid Medications" video.**

Prepare the patient and administer the IM medication

**10. As with any medication administration, remind the patient of the medication purpose, any adverse reactions, and administration procedure.**

**11. Remove bed linens and the patient's gown or clothing to access the selected injection site. Perform injection site selection, as described in step 3, with the deltoid muscle preferred for small volumes and the ventrogluteal for large volumes in adults.**

1. When delivering small volumes, such as immunizations, to the deltoid muscle, locate the acromial process at the top of the shoulder as your landmark. Mark two fingerbreadths down from the acromial process and envision an inverted triangle. Needle insertion should be at the center of the inverted triangle.
2. When delivering larger-volume injections, such as antibiotics, into the ventrogluteal muscle, have the patient lie comfortably on his/her side, with the selected hip exposed. Find the greater trochanter and iliac crest as landmarks. Place the palm of your hand, with the thumb pointing to the front of the patient, on the greater trochanter. Point the index finger at the anterior iliac crest and then spread the middle finger towards the back of the patient, forming a "V." The needle injection site is located between the knuckles of the index and middle fingers.

**12. Clean gloves should be donned at this time. Make sure to assess if the patient has a latex allergy, or use non-latex gloves to avoid allergic reactions.**

1. According to the CDC, it is unnecessary to clean the injection area with an alcohol prep pad, unless the skin is visibly soiled or dirty.

**13. The z-track technique for IM administration should always be used. The z-track technique prevents medication from leaking into the subcutaneous tissue. Hold the syringe in your dominant hand, and with your non-dominant hand, remove the needle cap.**

1. Using the non-dominant hand, pull the skin taut between the thumb and forefinger, pushing the adipose tissue approximately 1 inch away from the muscle.
2. Insert the needle at a 90° angle. Hold the syringe between the thumb and index finger of the dominant hand and insert it into the muscle using a quick, purposeful motion.
  1. VARIATION: When administering some IM medications (this does not include vaccinations) into the ventrogluteal, gluteus medius, or dorsogluteal muscles, it is recommended to aspirate for blood return. This prevents the accidental administration of medication into a blood vessel. This is not necessary for the deltoid or vastus lateralis muscles, because they do not contain large blood vessels.
  2. To aspirate, hold the syringe between the thumb and middle finger and gently push up on the plunger with the forefinger. If you see a blood return in the syringe, remove the needle from the site and begin the process again, selecting a different IM administration site.
3. Using the thumb or index finger of the dominant hand, press the plunger slowly to inject the medication at a rate of 1 mL per 10 s. You may stabilize the syringe in the skin with the fingers of the non-dominant hand. Using the dominant hand, push down on the plunger with the index finger or thumb.

**14. As with any injection, remove the needle smoothly, along the line of insertion; engage the safety device with the thumb of the dominant hand; and immediately place the needle and syringe directly into a "sharps" container.**

**15. If blood is present after injection, apply an adhesive bandage or cotton ball with silk/paper tape.**

**16. Replace all clothing and bed linens according to patient preference.**

**17. Finally, dispose gloves and waste into a garbage receptacle and wash hands with soap and water for at least 20 s, applying vigorous friction.**

**18. As with any medication, document the medication administration date, time, and location of in the electronic MAR.**

1. Variation: Immunizations may require additional documentation, depending upon facility policy.

**19. Prior to leaving the room, remind the patient about any side effects/adverse effects associated with IM injections, such as pain at the site, redness, bruising, or swelling. These should be immediately reported to the nurse.**

**20. Leave the patient room and wash hands with soap and water for at least 20 s, applying vigorous friction.**

## Applications and Summary

This video demonstrates the preparation and administration of IM medications. According to best practices, IM medications should be administered in the deltoid muscle for immunizations or medications less than 1 mL but not exceeding 2 mL. Large volumes (*i.e.*, more than 2 mL but less than 3 mL) should be administered in the ventrogluteal muscle; this site is used for antibiotics. Common errors in IM medication administration include administering large volumes to the deltoid muscle or using the gluteal muscle, causing the medication and needle to hit a nerve, bone, or adipose tissue. Another common error is using long needle lengths in patients with small amounts of muscle tissue, also increasing the chances of hitting bone tissue and causing osteomyelitis. As with any injection, failure to create a taut surface and hesitating with the injection may result in needle tip contamination, and recapping a used needle may lead to a needle-stick injury. Therefore, strict adherence to safe needle practices should always be enforced.

## References

1. Institute of Medicine. To Err is Human: Building a Safer Healthcare System. Academic Press. Washington, DC. (2000).
2. Centers for Disease Control and Prevention. <http://www.cdc.gov/>. (2017).