

Back to Basics

Administering IM Injections

The Right Way

This research-based protocol might change the way you give intramuscular injections.

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Do you remember the first time you gave a patient a “shot”? Were you nervous and hesitant? Administering medications by intramuscular (IM) injection is often the first invasive skill that nursing students learn.

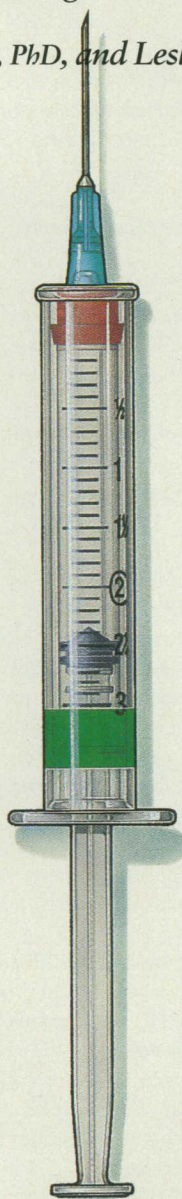
What many of us don’t recall, however, is that even this most basic skill has a solid research base. Researchers have studied IM sites, syringes, needles, and medication volumes. They’ve also studied interventions that can reduce pain and discomfort.

We asked over 200 nurses if they were aware of this research base. Most said they were not. Frankly, neither were we. So we decided to explore the literature, going back to the 1920s. We found over 90 studies related to IM injections. Using this literature and research base, we developed the following protocol for IM injections.

Preparing the medication

Preparing an IM injection is as important as administering it. Whenever possible, use a filter needle to draw up medication from an ampule or vial. Hold the container pointed down. Don’t use the last few drops in the container; some have been found to contain foreign substances, such as glass and rubber particles, that you might draw up into the syringe.

To minimize pain caused by tracking a medication through subcutaneous tissue, change to a dry, sterile needle before giving the injection. If you’re using a prefilled syringe to draw up medication from a vial or ampule, instill the complete dose (from both the prefilled syringe and the vial or ampule) into another syringe. This ensures that you’ll be using a sharp, clean



needle. (Inserting a needle through the rubber top of a vial can dull the needle or remove the needle coating that helps it glide through the skin.) If you’re using a prefilled unit-dose syringe, check that no medication has dripped onto the needle. If it has, wipe the needle with a dry, sterile pad before the injection.

Choosing the right size syringe

What size syringe should you use? Try to match it as closely as possible to the volume you’ll be injecting. Less than 0.5 mL requires a low-dose syringe that most closely approximates the required dose. A finely graduated syringe (a tuberculin syringe, for example) will help ensure that the correct dose is administered.

Research on the maximum volume to be drawn up for a single injection is still inconclusive. The best recommendation seems to be this: For a large muscle such as the gluteus medius, use no more than 4 mL for adults and 1 to 2 mL for children and persons with less developed muscles; for the deltoid, use no more than 0.5 to 1 mL. Of course, you’ll want to minimize discomfort and tissue damage by administering a large dose slowly.

Needle gauge and length depend on the consistency of the solution and how far the needle must be injected to reach the muscle. For most solutions, a 21- or 23-gauge needle is small enough to minimize tissue injury and subcutaneous leakage, yet large enough to allow easy passage. Needle length depends on the injection site. The ventrogluteal (VG) area has the most consistent depth of subcutaneous tissue; in adults, the adipose layer is always less than 3.75 cm. Generally, use a 1.5-inch needle for adults and a 1-inch needle for children. Sites with less subcutaneous fat, such as the deltoid or vastus lateralis, may require a 1-inch needle.

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Selecting the injection site

We suggest the VG as the primary site for anyone over seven months old. The underlying muscle is well developed, and the site is free of nerves and blood vessels. Research shows that injuries—including fibrosis, nerve damage, abscess, tissue necrosis, muscle contraction, gangrene, and pain—have been associated with all the common IM sites (dorsogluteal, deltoid, and vastus lateralis, for example) *except* the VG site.

There are, of course, contraindications for using the VG site: muscle contraction, damage in the area, and administration of hepatitis-B vaccine. With adults, use the deltoid to administer hepatitis-B vaccine; with infants under seven months, use the vastus lateralis.

To identify the VG site, position the palm of your right hand on the left greater trochanter so your index finger points toward the anterior superior iliac spine. (Use your left hand on the right greater trochanter.) Now spread your middle finger to form a V. The injection site is in the middle of the V.

Preparing the patient

As with any injection site, carefully assess it by observation and palpation. If the site is indurated, inflamed, or damaged, choose another site. If all injection sites show evidence of tissue damage, consider an alternate route.

If the VG site appears acceptable, position your patient so that the muscle at the site relaxes by following these steps:

- For patients lying on their side, have them flex the knee, then pivot the leg forward from the hip approximately 20° so it can rest on the bed.
- For patients in the supine position, have them flex the knee on the side where they'll receive the injection (for example, the right knee for an injection on the right side).
- For patients in the prone position, have them "toe-in" to internally rotate the femur.

Although it's possible to access the VG site while the patient is standing, this poses an obvious safety risk for both the patient and yourself.

Prior to injection, cleanse a circular area, two to three inches in diameter, with a 70% alcohol wipe. Wait at least 30 seconds to let the alcohol dry so it won't be introduced into subcutaneous tissue during the injection, which can cause irritation of the tissue.

How to administer the injection

Do not use an air bubble in the syringe. A holdover from the days of reusable syringes, this can affect the medication dosage by 5% to 100%. Modern disposable syringes are calibrated to give the correct dose without an air bubble.

Which injection technique should you use? Nursing textbooks describe two methods: spreading the skin between your fingers, and pulling the skin down or to one side (the Z-track technique). Spreading the skin increases the risk of medication leaking into the needle track and the subcutaneous tissue. The Z-track technique virtually eliminates this risk; it also produces fewer complications and less discomfort, making it the technique of choice.

When administering an IM injection, insert the needle quickly and smoothly, using a dartlike motion and steady pressure, at a 90° angle to the iliac crest, in the middle of the V you

formed with your fingers. After insertion, aspirate for five to 10 seconds. That may seem like a long time, but when the needle is in a small, low-flow blood vessel, it takes a while for the blood to appear. If no blood appears, inject the medication slowly—approximately 10 seconds per mL. This slow, steady rate promotes comfort and allows time for the tissues to expand and begin absorbing the solution.

After you've injected the solution, wait 10 seconds so that the medication can diffuse through the muscle. Then smoothly withdraw the needle at the same angle of insertion. Once the needle is out, use a dry, sterile sponge to apply gentle pressure at the site. Don't massage the site; this could cause tissue irritation.

Encourage the patient to perform leg exercises, such as flexion and extension, to help the muscle absorb the medication. Inspect the injection site within two to four hours. When you administer the next injection, check the former site for redness, swelling, pain, or other evidence of tissue damage. These findings are not normal or to be expected. They should be documented according to your agency's policy and communicated in a timely manner to the primary physician for further evaluation and treatment measures.

More research is needed

The research on IM injections is still continuing. An important area for study is the volume that various muscles can safely and comfortably absorb. For example, researchers have found various absorption rates for different muscles, but no one has documented the rate of absorption in the gluteal medius (target muscle of the VG site) or compared it with other muscles. More research also needs to be done on interventions for complications from IM injections. Although more than 200 adverse effects have been documented in the literature, no one has explored the efficacy of various interventions in minimizing these complications after they occur and in promoting healing.

Nurses have always wanted to provide a level of care that ensures the fewest possible negative outcomes. Today, this means studying the research that has a direct influence on clinical practice. Next time you give an IM injection, follow the protocol outlined here. Your technique will be solidly grounded in research. □

SELECTED REFERENCES

- Becroft, P. C., and Redick, S. A. Possible complications of intramuscular injections on the pediatric unit. *Pediatr.Nurs.* 15(4):333-336, July-Aug. 1989.
- Beyea, S. C., and Nicoll, L. H. Administration of medications via the intramuscular route: An integrative review of the literature and research-based protocol for the procedure. *Appl.Nurs.Res.* 8(1):23-33, Feb. 1995.
- Cockshott, W. P., et al. Intramuscular or intralipomatous injections? *N.Engl.J.Med.* 307(6):356-358, Aug. 1982.
- Farley, H. F., et al. Will that IM needle reach the muscle? *Am.J.Nurs.* 86(12):1327-1328, Dec. 1986.
- Keen, M. F. Comparison of intramuscular injection techniques to reduce site discomfort and lesions. *Nurs.Res.* 35(4):207-210, July-Aug. 1986.
- Keen, M. F. Get on the right track with Z-track injections. *Nursing* 20(8):59, Aug. 1990.
- Newton, M., et al. Reviewing the "big three" injection techniques. *Nursing* 72(2):34-41, Feb. 1992.
- Rettig, F. M., and Southby, J. R. Using different body positions to reduce discomfort from dorsogluteal injection. *Nurs.Res.* 31(4):219-221, July-Aug. 1982.
- Zenk, K. E. Beware of overdose. *Nursing* 3:28-29, Mar. 1993.