Drugs administered by the intramuscular (IM) route are deposited into vascular muscle tissue, which allows for rapid absorption into the circulation (Lister et al., 2020; Ogston-Tuck, 2014). Complications of a poorly performed IM injection include:

- Pain – strategies to reduce this are outlined in Box 1;
- Bleeding;
- Abscess formation;
- Cellulitis;
- Muscle fibrosis;
- Injuries to nerves and blood vessels (Small, 2004);
- Inadvertent intravenous access.

These complications can be avoided if the site for injection is accurately identified and a skilled evidence-based technique is used (Greenway, 2014).

**Evidence base**
The procedure for IM injection has been discussed widely in the literature but there are concerns that nurses are still performing outdated and ritualistic practice relating to site selection, aspirating back on the syringe (Greenway, 2014) and skin cleansing.

**Site selection**
Four muscle sites are recommended for IM administration:

- Vastus lateralis;
- Rectus femoris;
- Deltoid;
- Ventrogluteal (Fig 1, Table 1).

Traditionally the dorsogluteal (DG) muscle was used for IM injections but this muscle is in close proximity to a major blood vessel and nerves, with sciatic nerve injury a recognised complication (Small, 2004). In addition, drug absorption from the DG muscle may be slower than other sites and this can lead to a build-up of drugs in the tissues (Malkin, 2008).

Many patients find the use of the DG site intrusive and are reluctant to undress to give access to the relevant area. For these reasons, the DG muscle is no longer recommended for IM injections – in spite of...
this, many nurses continue to use it (Ogston-Tuck, 2014; Walsh and Brophy, 2011; Malkin, 2008).

**Needles**

Safety needles should be used for IM injections to reduce the risk of needle-stick injury (Health and Safety Executive, 2013).

Needle size is measured in gauges (diameter of the needle). A 21G is commonly used but selection depends on the viscosity of the liquid being injected (Lister et al, 2020). The UK Health Security Agency (2013) recommends 23G or 25G needles for IM vaccines.

- Needles need to be long enough to ensure the drug is injected into the muscle; length depends on:
  - Muscle mass;
  - Patient weight;
  - Amount of subcutaneous fat.

Women have more subcutaneous fat than men (Zaybak et al, 2007) and consideration must be given to using longer needles for patients who are obese. The UKHSA (2013) recommends that a 25mm needle be used for vaccine administration or a 38mm needle for larger adults. Lister et al (2020) suggest using patient weight as a guide to needle length:

- 31.5-90kg: 25mm;
- >90kg: 38mm.

Traditionally, nurses have been taught to leave a few millimetres between the skin and the hub of the needle in case the needle breaks off during the injection. This practice is not evidence based, may cause medication to be delivered into the subcutaneous fat layer and, with modern single-use needles, is no longer necessary (Greenway, 2014).

**Skin preparation**

There is some debate about using alcohol-impregnated swabs to clean injection sites. The UKHSA (2013) suggests that, if a patient is physically clean and generally in good health, swabbing the skin is not required. In older patients or those who are immunocompromised, skin preparation using an alcohol-impregnated (70% isopropyl alcohol) swab may be recommended (Lister et al, 2020). Follow local policy.

**Table 1. Maximum injectable volume per site in adults**

<table>
<thead>
<tr>
<th>Site</th>
<th>Volume, ml</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ventrogluteal</td>
<td>2.5</td>
</tr>
<tr>
<td>(recommended)</td>
<td></td>
</tr>
<tr>
<td>Vastus lateralis</td>
<td>5</td>
</tr>
<tr>
<td>(recommended)</td>
<td></td>
</tr>
<tr>
<td>Deltoid</td>
<td>1</td>
</tr>
<tr>
<td>Rectus femoris</td>
<td>5</td>
</tr>
<tr>
<td>Dorsogluteal (not</td>
<td>4</td>
</tr>
<tr>
<td>recommended)</td>
<td></td>
</tr>
</tbody>
</table>

Source: Adapted from Lister et al (2020)

**Aspiration**

It is common practice to draw back on a syringe after the needle is inserted to check whether it is in a blood vessel. Malkin (2008) suggested aspiration is only helpful when the DG muscle site is used to detect whether the needle has entered the gluteal artery. However, they noted this would be the result of "incorrect initial land-marking".

The UKHSA (2013) does not recommend aspiration for IM vaccinations in the anterolateral aspect of the thigh or the deltoid area of the upper arm. However, Lister et al (2020), in their procedure for IM injection, suggest aspirating the syringe before administering an IM injection to check that the needle is not in a vein. Given the different opinions on this practice, it is important to consult and follow your local policy.

**Gloves**

The World Health Organization (2010, 2009) states that gloves need not be worn for this procedure if the health worker’s and patient’s skin are intact, and notes that gloves do not protect against needle-stick injury. Nurses must risk assess individual patients (Royal College of Nursing, 2021) and be aware of local policies for glove use.

**Z-track technique**

A Z-track technique (Fig 2) can be used to prevent backtracking and leakage from the injection site (Lister et al, 2020).

**Procedure**

Equipment:
- Needles – one of which should be a safety-engineered device;
- Syringe;
- Drug for administration;
- Medicines administration chart/prescription;
- Receiver or tray to carry the drug;
- Sharps container.

1. Explain the procedure and gain consent.
2. Screen the patient to ensure privacy during the procedure.
3. Before drug administration, check whether the patient has any allergies.
4. Check the prescription is correct, following the 'five rights' of drug administration (Box 2) and local medicines administration policy to reduce the risk of error.
5. Wash and dry hands to reduce the risk of infection.
6. Assemble the syringe and needle, and withdraw the required amount of drug from the ampoule. Some medicines are available in pre-filled syringes and manufacturer’s instructions should be followed.
7. Disperse air bubbles from the syringe.
8. Change the needle. Doing so will ensure the needle used for the injection is sharp, thereby reducing pain (Agac and Günes, 2011). A safety-engineered needle should be used to reduce the risk of sharps injury.
9. Dispose of the used needle in a sharps container according to local policy.
10. Place the filled syringe in a tray and take it to the patient, along with a sharps bin so the used sharps can be disposed of immediately after the procedure.
11. Check the patient’s identity, according to local medicines management policy.
12. Position the patient comfortably with the injection site exposed. The site is influenced by the assessment of the patient, the drug and the volume to be injected (Lister et al, 2020).
13. Check the site for signs of oedema, infection or skin lesions. If any of these are present, select a different site.
14. Wash and dry hands.

**Box 2. Five rights of medicines administration**

- Right patient
- Right drug
- Right time
- Right dose
- Right route
Clinical Practice

Practical procedures

**Fig 2. Z-track technique**

2a. Pull the patient by about 2.5-3.75cm (Malkin, 2008) to displace the underlying tissue

2b. While holding the skin, administer the injection

2c. Allow the skin to return to its normal position, trapping the drug in the muscle

15. If, after the risk assessment, gloves are deemed necessary, these should be donned.

16. Ensure the skin is clean and follow local policy on skin cleansing.

17. If skin cleansing is considered necessary, swab for 30 seconds with isopropyl alcohol and allow to dry for 30 seconds (Lister et al, 2020).

18. Tell the patient you are going to carry out the procedure. Use distraction or relaxation techniques to reduce pain if needed.

19. Hold the syringe and needle in your dominant hand and gently stretch the skin around the injection site using your non-dominant hand. This displaces the subcutaneous tissue and aids needle entry (Lister et al, 2020).

20. Insert the needle at a 90-degree angle using a dart-like action. This prevents accidental depression of the plunger during needle insertion (Malkin, 2008) (Fig 3).

21. Follow local policy about aspiration of the syringe. If aspiration is indicated, pull back on the plunger; if blood appears, withdraw the needle and start the procedure again (Lister et al, 2020).

22. Depress the plunger slowly at a rate of 1ml/10 seconds; this aids absorption of the drug and reduces pain (Lister et al, 2020).

23. Wait for 10 seconds to allow the drug to diffuse into the tissue, then quickly withdraw the needle (Lister et al, 2020). Apply a plaster over the puncture site if required.

24. Dispose of the sharps directly into the sharps bin, and the syringe according to local policy.

25. Ensure the patient is comfortable and decontaminate your hands.

26. Record the administration on the prescription chart; also document the administration site as repeated injections into the same site can lead to induration and abscesses.

27. Monitor the patient for any effects of the prescribed medicine and any problems with the injection site. NT

**Fig 3. Needle insertion for intramuscular injections**

The needle should be inserted at 90 degrees and penetrate the muscle layer

15. If, after the risk assessment, gloves are deemed necessary, these should be donned.

16. Ensure the skin is clean and follow local policy on skin cleansing.

17. If skin cleansing is considered necessary, swab for 30 seconds with isopropyl alcohol and allow to dry for 30 seconds (Lister et al, 2020).

18. Tell the patient you are going to carry out the procedure. Use distraction or relaxation techniques to reduce pain if needed.

19. Hold the syringe and needle in your dominant hand and gently stretch the skin around the injection site using your non-dominant hand. This displaces the subcutaneous tissue and aids needle entry (Lister et al, 2020).

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**References**


Health and Safety Executive (2013) Health and Safety (Sharp Instruments in Healthcare) Regulations 2013: Guidance for Employers and Employees. HSE.


Royal College of Nursing (2021) Tools of the Trade: Guidance for Healthcare Staff on Glove Use and the Prevention of Work-Related Dermatitis. RCN.


