

Injection technique 2: administering drugs via the subcutaneous route

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Abstract The subcutaneous route allows drugs such as insulin and heparin to be absorbed slowly over a period of time. Using the correct injection technique and selecting the correct site will minimise the risk of complications. This is the second article in a two-part series on injection techniques. Part 1 covered the intramuscular route.

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Box 1. 'Five rights' of medicines administration

- Right patient
- Right drug
- Right time
- Right dose
- Right route

Drugs administered by the subcutaneous route are deposited into subcutaneous tissue (Fig 1); small volumes (up to 2ml) of non-irritant, water-soluble drugs can be administered by subcutaneous injection (Dougherty and Lister, 2015).

Unlike muscle, subcutaneous tissue does not have a rich blood supply, and absorption of drugs delivered via that route is therefore slower than via the intramuscular route (see part 1) (Dougherty and Lister, 2015). This slower rate of absorption is beneficial when continuous absorption of a drug is required; for example, with insulin or heparin (Hunter, 2008).

Factors affecting blood flow to the skin, including exercise and changes in environmental temperature, can affect drug absorption. The subcutaneous route may be unreliable in patient with conditions that result in impaired blood flow, such as circulatory shock (Dougherty and Lister, 2015).

It is often suggested that the subcutaneous route is relatively pain free (Zijlstra et al, 2018; Srivastava and Robson, 2012) but the evidence supporting this assertion is poor and further research is required. A Cochrane review in 2017 looked at the duration of pain and bruising after subcutaneous heparin injection and reported that a slow injection – taking 30 seconds to administer – may reduce pain but there is no difference in bruising compared with a fast injection (Mohammady, 2017). The researchers noted that the evidence was of low quality.

Complications associated with subcutaneous injections include abscesses and, in patients who require frequent injections, there is a risk of lipohypertrophy; this is characterised by an accumulation of fat under the skin. Lipohypertrophy occurs when multiple injections are repeatedly administered into the same area of skin. It can be painful and unsightly, and affect drug absorption, but can be prevented by rotating injection sites (Down and Kirkland, 2012).

Preparation Site selection

Recommended sites for subcutaneous injection include the lateral aspects of the

upper arm and thigh, and the umbilical region of the abdomen (Ogston-Tuck, 2014; Hunter, 2008). The back and lower loins can also be used (Fig 2).

Injection sites should be:

- Clean;
- Free of infection, skin lesions, scars, birthmarks, bony prominences, and large underlying muscles, blood vessels or nerves (Dougherty and Lister, 2015).

As the amount of subcutaneous fat varies between patients, individual patient assessment is vital before carrying out the procedure. It is important to avoid inadvertently injecting the drug into muscle, as intramuscular injection can affect drug absorption; for example, inadvertent administration of insulin into the muscle can lead to accelerated insulin absorption and lead to hypoglycaemia (Down and Kirkland, 2012).

A lifted skinfold technique (pinching or bunching the skin) can be used to lift the subcutaneous layer away from the underlying muscle (Down and Kirkland, 2012) (Fig 3). This method reduces the risk of inadvertent intramuscular injection when undertaken correctly; however, releasing the skin too quickly before the injection is completed or lifting it incorrectly can increase that risk (Down and Kirkland, 2012).

Needles

Safety needles should be used for subcutaneous injections to reduce the risk of needle-stick injury (Health and Safety Executive, 2013). Some drugs such as heparin come in a pre-loaded syringe and patients prescribed insulin may use insulin delivery devices.

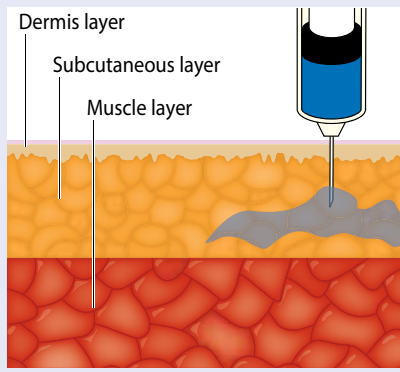
Needle size is measured in gauges (diameter of the needle) – a 25G is commonly used for subcutaneous injections (Dougherty and Lister, 2015; Public Health England, 2013). Needle size depends on the viscosity of the liquid being injected (Dougherty and Lister, 2015).

Needles need to be long enough to inject the drug into the subcutaneous tissue. They come in lengths of 4-8mm. Dougherty and Lister (2015) suggest the required needle length can be estimated by pinching the skin using the lifted skinfold

Clinical Practice

Practical procedures

Fig 1. Tissue structure and subcutaneous injection



technique (Fig 3) and selecting a needle that is 1.5 times the width of the skinfold.

Skin preparation

There is debate around the use of alcohol-impregnated swabs to clean injection sites. The World Health Organization (2010) suggested that if a patient is physically clean and generally in good health, swabbing of the skin before injection is not required. This was supported by Hicks et al (2011) in the *First UK Injection Technique Recommendations*.

In older patients and those who are immunocompromised, skin preparation using an alcohol-impregnated swab (70% isopropyl alcohol) may be recommended (Dougherty and Lister, 2015). The patient's condition should be individually assessed and local policies should be followed.

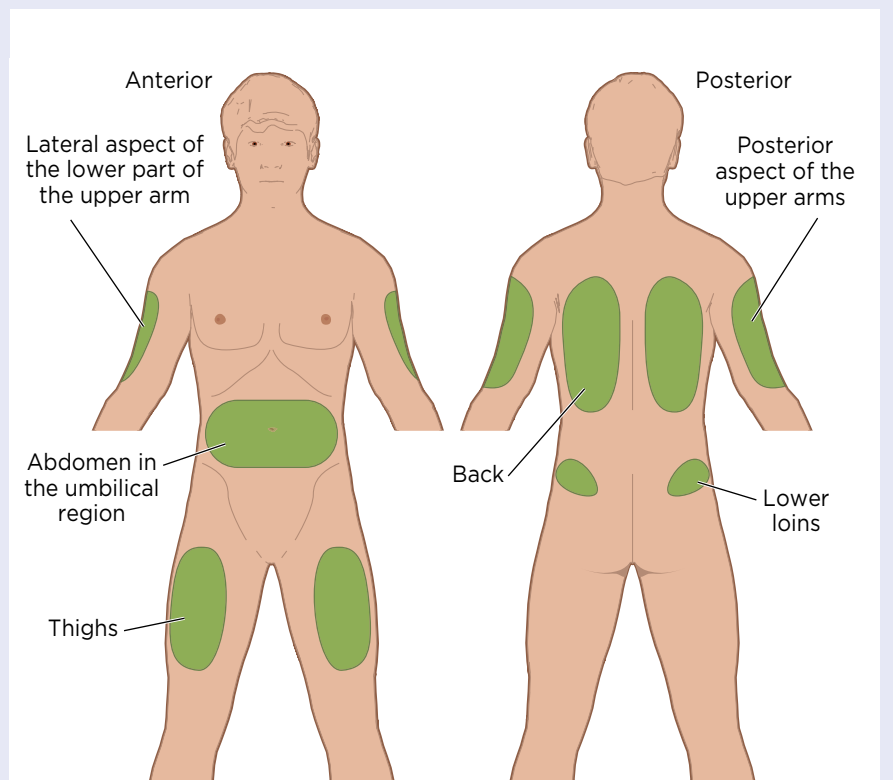
Aspiration

It is common practice to draw back on a syringe after the needle has been inserted to check whether it is in a blood vessel. This is not recommended for subcutaneous injections, as there are no major blood vessels in the subcutaneous tissue and the risk of inadvertent intravenous administration is minimal (Public Health England, 2013).

Gloves

The WHO (2010; 2009) stated that gloves need not be worn for this procedure if the

Fig 2. Subcutaneous injection sites



skin of both health worker and patient is intact. It also notes that gloves *do not* protect against needlestick injury. Nurses need to assess risk in each individual patient (Royal College of Nursing, 2018) and be aware of local policies for glove use.

Angle of injection

It is recommended that subcutaneous injections, particularly of insulin, are administered at a 90° angle to ensure that the medication is delivered into the subcutaneous tissue (Down and Kirkland, 2012; Hunter, 2008). However, patient assessment is vital – patients who are cachectic and therefore have minimal amounts of subcutaneous tissue may require injections to be delivered at a 45° angle.

PHE (2013) recommends that subcutaneous vaccinations are given with the needle at a 45° angle to the skin and the skin should be pinched together (PHE, 2013).

Procedure

Equipment:

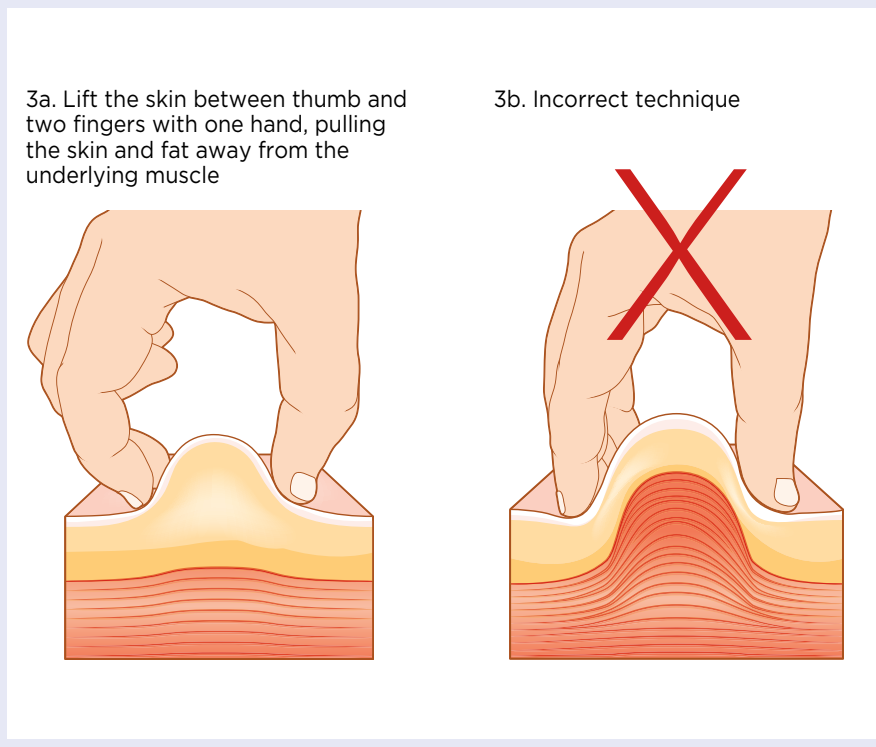
- Needles (one of which should be a safety-engineered device) and syringe or prefilled syringe;
- Drug for administration;
- Medicines administration chart/prescription;

- Receiver or tray to carry the drug;
 - Sharps container.
1. Explain the procedure to the patient and gain consent.
 2. Screen the patient to ensure privacy during the procedure.
 3. Check whether the patient has any allergies.
 4. Check the prescription is correct and follow the 'five rights' of medicines administration (Box 1) 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 then draw the required amount of drug from the ampoule. Some drugs are available in pre-filled syringes and manufacturer's instructions should be followed.
 7. Disperse any air bubbles from the syringe.
 8. Change the needle to ensure that the one you are about to use for injecting the drug is sharp, thereby reducing pain (Agaç and Günes, 2011). To reduce the risk of sharps injury, a safety-engineered needle should be used for injection.

Professional responsibilities

This procedure should be undertaken only after approved training, supervised practice and competency assessment, and carried out in accordance with local policies and protocols.

Fig 3. Lifted skinfold technique



9. Dispose of the needle used to draw the drug in a sharps container according to local policy.
10. Place the injection in a tray and take it to the patient, along with a sharps bin so the used needle 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 selected injection site exposed (Fig 2).
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.
15. If gloves are considered necessary following risk assessment, put gloves on.
16. Ensure the skin is clean or follow local policy on skin cleansing.
17. If skin cleansing is considered necessary, swab for 30 seconds with isopropyl alcohol and then allow to dry for 30 seconds (Dougherty and Lister, 2015).
18. Inform the patient that you are going

- to carry out the injection. Use distraction and relaxation techniques to reduce anxiety if needed.
19. Hold the syringe and needle in your dominant hand and pinch the skin together using the non-dominant hand to lift the tissue away from underlying muscle (Fig 3) (Dougherty and Lister, 2015).
20. Insert the needle at the required angle (usually 90°) using a dart-like action. Aspiration to check whether the needle is in a blood vessel is not necessary (PHE, 2013).
21. Depress the plunger and inject the drug slowly over 10-30 seconds (Dougherty and Lister, 2015).
22. Wait 10 seconds before withdrawing the needle (Down and Kirkland, 2012) – this will prevent backtracking of the drug (Hunter, 2008) – and then withdraw the needle. Do not massage the area, as this can lead to bruising following administration of heparin (Ogston-Tuck, 2014) and speed up absorption times with insulin (Down and Kirkland, 2012).
23. Release the lifted skinfold (Down and Kirkland, 2012).
24. Dispose of sharps directly into the

sharps bin and dispose of the syringe according to local policy.

25. Ensure the patient is comfortable and wash hands.
26. Record administration on the prescription chart. Also record administration site so that the same site is not repeatedly used. This is to avoid lipohypertrophy.
27. Monitor the patient for any effects of the prescribed medicine and any problems with the injection site.
28. Patients receiving injection in a health centre or outpatient department may need to wait for a period of time to monitor for any reaction to the drug. Local policies should be followed. **NT**

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CLINICAL
SERIES

Injection technique series

Part 1: Intramuscular route Aug
Part 2: Subcutaneous route Sep