Injection Technique

RECOMMENDATIONS
Injection technique

- Standards and good practice on insulin injection technique are essential for health care professionals (doctors, nurses) in order to administer insulin correctly and to educate patients or their relatives adequately.

- The proper injection technique helps diabetic patients to achieve the best possible health outcomes by ensuring that the correct dose of medication is delivered to the correct injection site, using the correct needle size.

- When administering insulin via subcutaneous injections, consistency of the injection and dose accuracy are essential (performance).
Education

- **Healthcare professionals are responsible for educating patients** about correct insulin injection technique in inpatient setting.

- Their knowledge, practice, and commitment are key factors for controlling patients’ blood sugar levels and for educating patients and their relatives for correct insulin injection technique through insulin pen.

- **However, some studies show that nurses’ knowledge and practice relating to insulin therapy is insufficient**.

- It is important to make sure if the healthcare professionals possess the current and proper knowledge about the technique of injection.

Injection technique

The proper injection technique includes\textsuperscript{2,3}:

- injection site
- lifting a skinfold
- angle of injection
- site rotation
- needle length
- needle gauge


The recommended injection sites are: abdomen, thigh, buttock, and upper arm.

The injection site should be disinfected and must be allowed to dry completely before the injection is given.

Patients should never inject into sites of lipohypertrophy, inflammation, edema, ulceration, or infection.
Recommended injection sites

- Thigh
- Abdomen
- Buttocks
- Arms
Injection site

Regular rotation of the injection site helps to maintain healthy tissue and avoid from lipohypertrophy (LH).

Further injections should be spaced at least 1 cm from previous injection.

Injections in the belly should be approximately 4 cm away from the navel. The tissue close to the belly button is tougher, so the insulin absorption will be irregular.

Areas with scars, bruises, and recent injection sites should generally be avoided³.

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Site rotation pattern
Lifting a skinfold

- Lifting a skinfold is **required when the distance from the skin surface to the muscle is less than or equal to the needle length**.

- **Adults do not require** the lifting of a skinfold, particularly for **4 mm and 5 mm** pen needles.

**Lifting a skinfold IS REQUIRED:**

- **In children** who are **slim**, when injecting into the **limbs or abdomen**, especially when using **a 5 mm or 6 mm needle**.

- **In adults** who use **8 mm pen needle** and / or inject at **45 angle** in order to avoid injecting into muscle\(^5\).
Lifting a skinfold

A correct fold is made by lifting the skin with the thumb and index finger (possibly adding the middle finger). If the skin is lifted using the whole hand, muscle may be lifted as well as subcutaneous tissue, which can lead to intramuscular injections.²⁴


Lifting a skinfold

THE OPTIMAL SEQUENCE when injecting into a skinfold is as follows:

- Gently **lift a skinfold**.
- **Inject the insulin slowly at a 90 angle** to the surface of the skinfold.
- Do not aspirate the needle.
- Let the needle remain in the skin for a **count of 10 after the plunger** is depressed.
- **Withdraw the needle** from the skin at the same angle it was inserted.
- Release the skinfold.
- **Do not massage** the injection site.
- Dispose of the used needle safely.

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Angle of needle entry / without skin fold

- For the average adult, the 4 mm pen needles are appropriate and can be injected at a 90-degree angle to the skin surface.

- Although in obese patients longer pen needle can be used.

- Injection of drug to children without a skinfold is not recommended\(^2,6,11\).

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Angle of needle entry / with skin fold

- Creating a skin fold is highly recommended for slim individuals and children.\(^6\)

- Alternatively, insertion at a 45-degree angle is sensible. Both techniques can be combined.

- The use of a lifted skin fold or injection at a 45-degree angle is suggested whenever a pen needle longer than 6 mm is used\(^2,11\).

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Needle diameter

- High flow rate needles (extra-thin wall) needles have been shown to be appropriate for all injecting patients.
- Use needles of the smallest diameter (highest gauge number), and the tip with the lowest penetration force to minimize pain.
### Needle length

<table>
<thead>
<tr>
<th>Needle length</th>
<th>Children</th>
<th>Slim adults</th>
<th>Normal weight adults</th>
<th>Overweight or obese adults</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 mm</td>
<td>Lifting a skinfold and 90° 25-30G</td>
<td>Lifting a skinfold and 90° 25-30G</td>
<td>90° without lifting a skinfold 25-30G</td>
<td>90° without lifting a skinfold 25-30G</td>
</tr>
<tr>
<td>5 mm</td>
<td>Lifting a skinfold and 45° or 90° 25-30G</td>
<td>Lifting a skinfold and 45° or 90° 25-30G</td>
<td>Lifting a skinfold and 90° 25-30G</td>
<td>90° without lifting a skinfold 25-30G</td>
</tr>
<tr>
<td>6 mm</td>
<td>Not recommended</td>
<td>Lifting a skinfold and 45° or 90° 25-30G</td>
<td>Lifting a skinfold and 90° 25-30G</td>
<td>90° without lifting a skinfold 25-30G</td>
</tr>
<tr>
<td>8 mm</td>
<td>Not recommended</td>
<td>Lifting a skinfold and 45° 25-30G</td>
<td>Lifting a skinfold and 45° 25-30G</td>
<td>Lifting a skinfold and 45° or 90° 25-30G</td>
</tr>
<tr>
<td>10 mm</td>
<td>Not recommended</td>
<td>Lifting a skinfold and 45° 25-30G</td>
<td>Lifting a skinfold and 45° 25-30G</td>
<td>Lifting a skinfold and 45° or 90° 25-30G</td>
</tr>
<tr>
<td>12 mm</td>
<td>Not recommended</td>
<td>Not recommended</td>
<td>Lifting a skinfold and 45° 25-30G</td>
<td>Lifting a skinfold and 45° or 90° 25-30G</td>
</tr>
</tbody>
</table>

Needle length

- Very young children (6-years old and under) and extremely thin adults (BMI<19) should use the 4 mm needle by lifting a skin fold and inserting the needle perpendicularly into it to avoid IM injection.

- For children and adolescents using a 5 or 6 mm needle, a lifted skin-fold technique will be required to avoid possible IM injection.

- For very lean patients, even short needles (4, 5 and 6 mm) may require to raise a fold of skin and inject at an angle to prevent a possible IM injection.

- The needle lengths that were once recommended for SC injection (for adults, > 8 mm; for children, >6 mm) are now known to be too long because they increase the risk of IM injections without evidence of improved glucose control. Patients using 8 mm needle or longer should ensure they are using a lifted skin fold to avoid IM injection.²
Needle reuse

All of diabetic organisations, institutions, associations and experts as well as manufacturers advise against the reuse of needles for subcutaneous insulin injection, arguing a possible relationship with numerous health risks, including:

• infection,

• cutaneous lipodystrophy (a skin condition characterized by the loss subcutaneous fat localized to sites of insulin injection),

• more painful punctures,

• loss of accuracy in insulin dose administration.
Needle reuse

Risks of needle reuse:

It is important to dispose of needles safely after use to avoid needle injuries.

- There is an association between needle reuse and lipohypertrophy.
- There is an association between reuse and injection pain or bleeding.

Reusing insulin needles is not an optimal injection practice, and patients should be discouraged from doing so. It is stated that pen needles (and syringe needles) should be used only once. They are no longer sterile after use.²

How to prevent insulin bubbling?

- If air bubbles are found in the syringe, **tap on the barrel** to bring them to the surface. They may then be removed by pushing the plunger up.
- **Avoid** vigorous **shaking** as it affects accurate dosing.
- Remember to **make a priming** of the drug.

Insulin leakage

Reasons for insulin leakage from the skin:\n
A small amount of skin leakage (a little pearl of liquid at the injection site) can be ignored. It is almost always clinically insignificant.

- An angled needle insertion at 45° caused more leakage at 90°.
- High injected volumes of drugs (including insulin).
- Taken out the pen needle from the skin too soon after injecting (do not count to 10).
- Leakage of insulin is more frequent in obese patients.

A shorter needle causes less or equal amount of leakage than when using a longer needle.

For patients who report frequent skin leakage, direct observation of their self injection is important for detecting possible technique-related issues that can be modified.

Insulin leakage

How to prevent leakage of insulin?

- Use **thin-wall** or extra-thin-wall pen needle.

- **Count to 10 after the plunger** is fully depressed before removing the needle from the skin. This allows enough time for the injected medication to spread out through the tissue planes and to cause the tissue to expand and stretch.

- **Split larger doses** of drug / insulin.

- **Reduce the volume of drug** injected to a **maximum of 800 μL** at one time.\(^\text{12}\).

- **Avoid** injecting a site showing signs of **lipohypertrophy**.

- Systematically **rotate the injection sites**.

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Compatibility with pen injectors

Information for users included in IFU for droplet pen needle:

- **Read** and follow “Instructions for Use” before using your pen needles and pen injector.

- Before each injection, **check** that your **pen injector** contains the correct type of medication.

- **Ask your healthcare professional** which needle gauge and length is best for you.

- If these are not followed, there is a risk of incorrect medication, incorrect dosage, needle breaking, disease transmission or infection.

- Seek immediate medical attention if you have any health concern.


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