Administering intramuscular and subcutaneous injections in children

Sound clinical judgement and individualised assessment is essential to ensure safe practice when administering injections to children, writes Naomi Bartley

Children and nurses often view the administration of injections as a traumatic procedure. Nurses aim to avoid administering injections to children unnecessarily. However, certain medications may only be administered by injection, as alternative routes are not viable or may not facilitate absorption. Correct injection technique can reduce complications, injury and discomfort for the child.

Recent years have seen a reduction in the use of intramuscular injections in particular. The introduction of alternative analgesia techniques, such as epidurals, intravenous infusions, and patient and nurse controlled analgesia has reduced the volume of injections administered. Despite this, the administration of injections remains a fundamental nursing practice and children's nurses need to update their knowledge and skills.

Necessary skills for good injection technique include knowledge of: anatomy and physiology; pharmacology; suitable injection sites and injection techniques for children; clinical holding; and effective communication skills.

Evidence-based nursing guidelines for the administration of both intramuscular (IM) and subcutaneous (SC) injections were created within Our Lady's Children's Hospital to support best practice and safe administration of medication.

Individual child assessment

The nurse should initially assess whether an injection is the optimum route for the child. There is no universal agreement on optimum injection site, needle size or injectable volumes, therefore, children's nurses must recognise the importance of individual child assessment and clinical judgement to ensure best practice when administering IM and SC injections to children (see Table 1).

An injection is the percutaneous introduction of a medicine via needle and syringe but may also involve newer devices, such as an auto-injector (see Table 2).

An IM Injection is a method of administering medication directly into muscle tissue. The rate of medication absorption is faster than the SC route and muscles tolerate a greater volume of fluid (see Table 3).

An SC injection delivers medication below the epidermis and dermis layers into subcutaneous tissue. The rate of absorption is slower than the IM route, as SC tissue has less blood supply. SC injections are often self-administered by the child or given by a family member or caregiver. Education and support are vital. Some children use an automatic injection device when administering an SC injection (see Table 4).

Injection sites for children

Individual assessment is recommended to select the appropriate injection site for children and use of the correct injection site is a major factor in limiting complications. When identifying an injection site, position the child to allow relaxation of the limb.

Factors to consider

- **Child**
  - Size/age: the muscle should be accessible, well-perfused, well-developed and able to tolerate the volume of the medication. For IM injections, the vastus lateralis is recommended for children under two years of age. For children over three years, the deltoid may be more appropriate.
  - Child/parent's preference: Encourage involvement, when appro-

**Table 1**

<table>
<thead>
<tr>
<th>Intramuscular injection sites*</th>
</tr>
</thead>
<tbody>
<tr>
<td>The deltoid</td>
</tr>
<tr>
<td>This is easily accessible but not recommended for repeated injections or large volumes due its small muscle mass</td>
</tr>
<tr>
<td>Land marking this site:</td>
</tr>
<tr>
<td>• Expose the arm completely from shoulder to elbow</td>
</tr>
<tr>
<td>• Two finger widths down from acromion process; the bottom edge is at an imaginary line drawn from axilla</td>
</tr>
<tr>
<td>• Injection site is 3-5cm below the acromion process</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>The vastus lateralis</th>
</tr>
</thead>
<tbody>
<tr>
<td>This stretches from the greater trochanter of the femur to the lateral condyle of the knee. It is an ideal site as it is easily accessible, a large muscle mass and has no major blood vessels or nerves in the area</td>
</tr>
<tr>
<td>Land marking this site:</td>
</tr>
<tr>
<td>• Identify greater trochanter and lateral femoral condyle. Identify the muscle position</td>
</tr>
<tr>
<td>• Divide the muscle into thirds. Middle third is the injection site, in the upper lateral quadrant of the thigh</td>
</tr>
</tbody>
</table>

Subcutaneous injection sites

- **Upper thigh, abdomen, upper arm and buttocks**
- **Abdomen is the preferred site as medication is absorbed more quickly and uniformly and less affected by exercise**

*Important: The gluteus maximus muscle is not recommended for IM injections in children, due to the potential for damage to the nearby sciatic nerve and gluteal artery

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Use of auto-injectors

- Used with SC injections only
- Needle angle will be 90 degrees
- Single-use product
- Refer to the manufacturer's instructions as various products are available
- Can assist in reducing fears associated with injection

Medication

- Frequency of injections – sites must be rotated to avoid fibrosis of the injection site
- For the administration of more than one injection, use separate sites. If using one limb, allow a distance of 25mm between sites to reduce local reactions
- Type of medication and specific manufacturer's instructions for administration.

Volume of injection

This is poorly researched for children. Individual assessment of the child and the medication is essential.

For IM injections, 0.5-2ml may be injected depending on the age and size of the child. The Z-track technique can reduce pain and prevent complications associated with IM injections. This technique avoids potential back flow of medication as the needle track is sealed.

Administering an IM injection

1. Consider correct route
   - IM route appropriate for this child?
2. Select correct site
   - Individually assess each child
3. Prepare child/family
4. Select correct needle length. Individually assess each child
5. Prepare medication
6. Administer IM injection
   - Inject medication to densest portion of muscle
   - Inject at a 90º angle
   - Aspirate for five seconds. Discard if blood is present
   - Inject medication slowly (10 sec/ml)
   - Leave needle in place for 5-10 seconds after injecting medication
   - Remove needle swiftly
   - Apply gentle pressure with sterile gauze. Do not rub
   - Use Z-track technique if possible
7. Reassure and praise child
8. Assess child
9. Document procedure

Administering a SC injection

1. Consider correct route
   - SC route appropriate for this child?
2. Select correct site
   - Individually assess each child
3. Prepare child/family
4. Select correct needle length. Individually assess each child
5. Prepare medication
6. Administer SC injection
   - Gently bunch/lift up skin
   - Inject at a 45º or 90º angle
   - 90º angle insertion: recommended for all ages
   - 45º angle insertion: if needle length is greater than 8mm or for children with little subcutaneous tissue
   - Avoid squeezing the skin too tightly
   - Inject medication slowly and release skin
   - Leave needle in place for 5-10 seconds after injecting medication
   - Remove needle swiftly
   - Apply gentle pressure if any evidence of bleeding
7. Reassure and praise child
8. Assess child
9. Document procedure
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Table 5
Z-track technique

- Gently pull/displace the skin with your non-dominant hand, 1 cm laterally from the land marked injection site. This displaces the tissues prior to injection
- Hold this position until the medication is administered and the needle is removed
- After removing the needle, release the pull on the skin. This seals the medication within the muscle layer and prevents medication leakage

Table 6
General principles for the administration of injections

Preparation of medication
- Gather equipment in advance
- Decontaminate hands before and after the procedure
- Select syringe size as similar as possible to medication volume to ensure accurate dosage
- Select needle length and gauge according to individual child assessment
- Change needles after drawing up medication, so a clean needle is used for administration. This reduces tissue irritation, pain and inadvertent administration of foreign particulate matter

Administering the injection
- Administer all medication as per local policy and ABA guidelines
- Use non-dominant hand to secure the injection site and use dominant hand to inject the medication
- Hold syringe firmly between thumb and forefinger, with heel of the hand resting on the thumb of the non-dominant hand
- Skin disinfection is not required – use soap and water if necessary. Children who are immunosuppressed do require skin disinfection. Allow the chlorhexidine/alcohol swab 40 seconds to dry prior to injection
- For heparin or insulin injections, avoid alcohol swabs as alcohol may interfere with these medications
- Insert needle smoothly and swiftly to avoid trauma
- If possible, leave needle in place for 5-10 seconds after injecting medication to allow tissue expansion and medication absorption
- Apply gentle pressure with sterile gauze. Do not rub the site as this may cause discomfort and/or interfere with medication absorption

Injections for infants
- Administer oral sucrose two minutes prior to and during the procedure to reduce pain
- Providing a carbohydrate containing drink one to two minutes prior to injection can reduce pain
- Offer a soother if appropriate

Children with bleeding disorders
- Seek expert advice before administering injections to children with thrombocytopenia, bleeding disorders or those on anticoagulants
- Use a 23 gauge needle
- Consider administering medication by SC injection
- Apply pressure with sterile gauze to the injection site for 1-2 minutes after the injection

After the injection
- Dispose of equipment as per local policy
- Assess child during and after the procedure
- Document the procedure
- Refer any adverse events to medical team as appropriate
- Provide verbal or written advice to the child/parent/carer
- Ensure clothing at the site is not too tight to reduce discomfort

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References:

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