



GUIDELINES ON THE ADMINISTRATION OF INTRAMUSCULAR AND SUB-CUTANEOUS INJECTIONS


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Our Lady's Children's Hospital, Crumlin		
Document Name: Guidelines on the Administration of Intramuscular and Sub-Cutaneous Injections		
Reference Number: AISCI-02-2017-NB-V3	Version Number: V3	
Date of Issue: February 2017	Page 2 of 21	

CONTENTS

	Page Number
1.0. Introduction	3
2.0. Definition of Guidelines	3
3.0. Definitions	3
4.0. Applicable to	3
5.0 Objectives of the Guideline	3
6.0. Complications associated with injections	4
7.0. IM Injections	4
7.1 IM Injection Sites	4
7.2 DELTOID	5
7.3 VASTUS LATERALIS	5
7.4 Selecting the injection site	6
7.5 Z-Track Technique	7
7.6 Volumes for IM Injections	7
7.7 Select Needle/Syringe	7
7.8 IM Injection for children with bleeding disorders	7
7.9 Aspirating before Injection	8
8.0 Guidelines on the Administration of an IM Injection	8
9.0 SC Injections	11
9.1 Guidelines on the Administration of a SC Injection	12
9.2 Auto-Injectors	14
10.0 Specific Care when Administering an Immunisation	14
11.0 Companion Documents	15
12.0 Implementation Plan	15
13.0 Monitoring and / or Audit	16
14.0 References	16
15.0 Appendix 1: Quick Guide: Administering an IM Injection	19
16.0 Appendix 2: Quick Guide: Administering a SC Injection	20
17.0 Appendix 3: Available Needles in OLCHC	21

Our Lady's Children's Hospital, Crumlin		
Document Name: Guidelines on the Administration of Intramuscular and Sub-Cutaneous Injections		
Reference Number: AISCI-02-2017-NB-V3	Version Number: V3	
Date of Issue: February 2017	Page 3 of 21	

1.0 Introduction

Certain medications may only be administered by injection, when alternative routes are not viable or do not facilitate absorption of medication (Ford et al 2010). Injections may be viewed as a traumatic procedure for children, therefore it is important to assess if an injection is necessary and justified prior to its administration. An appropriate injection technique reduces discomfort and complications for the child (Hunter 2008). 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.

The introduction of alternative analgesia techniques, (epidurals, patient and nurse controlled analgesia) has reduced the volume of injections administered. Therefore, it is acknowledged that nurses are currently administering fewer injections. Some principles of administering injections may be based on custom and practice (Greenway 2014). It is essential that nursing practice is evidence based and each child is individually assessed. It is recommended that nurses regularly review information on this practice (Greenway 2014).

NOTE: Nursing students must be supervised *at all times* when administering IM and SC medications (OLCHC 2010a).

2.0 Definition of Guidelines

This guideline represents written instructions to ensure high quality care. Guidelines must be accurate, up to date, evidence-based, easy to understand, non-ambiguous and emphasise safety. When followed they should lead to the required standards of performance.

3.0 Definitions

Intramuscular (IM) injection: A method of administering medication directly into muscle tissue (Macqueen et al 2012).


Subcutaneous (SC) injection: Delivers medication below epidermis and dermis layers into SC tissue (Ford et al 2010)

4.0 Applicable to

These guidelines are applicable to nurses who administer medications by injection to children.

5.0 Objectives of the Guideline:

These guidelines provide an evidence-based approach and support best practice for the administration of intramuscular (IM) and subcutaneous (SC) injections. The goal of these guidelines is to facilitate the maximum therapeutic effects of medications while reducing complications, injury and discomfort for the child. Algorithms are presented for both IM and SC injections (Appendix 1, 2). Specific information in relation to administering immunisations is also included (10.0).

Our Lady's Children's Hospital, Crumlin		
Document Name: Guidelines on the Administration of Intramuscular and Sub-Cutaneous Injections		
Reference Number: AISCI-02-2017-NB-V3	Version Number: V3	
Date of Issue: February 2017	Page 4 of 21	

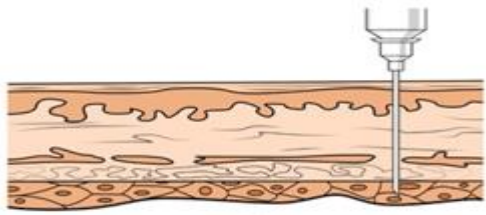
6.0 Complications associated with injections

Most complications are associated with intramuscular injections but may occur with any route. Complications may be due to the use of an incorrect site, inappropriate depth or rate of injection (Malkin 2008).

Potential complications include:

- Pain (minor discomfort for a short time after an injection is normal) (Barron and Hollywood 2010).
- Nerve damage, tissue necrosis, intramuscular haemorrhage, abscess, allergic reaction, needle phobia (Ford et al 2010)
- Intravascular injection, cellulitis
- Muscle fibrosis with repeated use of the same site (Ford et al 2010)
- Medication errors with use of low dose insulin syringes (measurements in units not mls) (Ford et al 2010)

7.0 IM Injections

INTRAMUSCULAR INJECTION	
<ul style="list-style-type: none"> • Absorption rate is faster than SC route • Muscles tolerate greater fluid volumes (Barron and Hollywood 2010) • Maximum volume = 2mls (Macqueen et al 2012) 	

7.1 IM Injection Sites

There is no universally accepted optimum site for IM injections in children (Macqueen et al 2012). Clinical judgement is vital to assess each child individually in order to avoid complications and ensure best practice.

Recommended sites for IM Injections (NIAC 2013)	
0-12 months	Vastus lateralis
13-36 months	Vastus lateralis or Deltoid (if sufficiently developed)
3 years and older	Deltoid

Dorsogluteal site: **NOT RECOMMENDED FOR CHILDREN** due to potential damage to sciatic nerve and gluteal artery (Bagis et al 2013, Ford et al 2010). Ventro-gluteal site is also not recommended (Barron and Hollywood 2010).

7.2 Deltoid

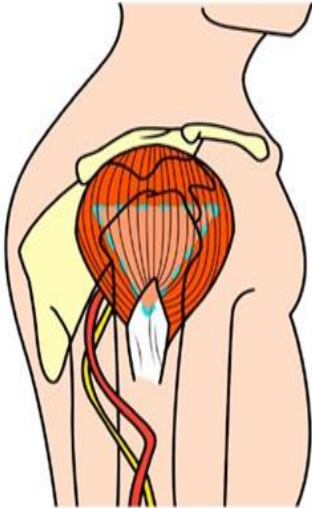


Fig 2: Deltoid Site

- Commonly used as it is easily accessible
- Not recommended for repeated injections or large volumes due its small muscle mass (Dougherty and Lister 2011)
- Radial nerve is superficial in infants: bunch up the skin prior to injection (NIAC 2013)

Land marking the Injection Site:

- Remove clothing and expose the arm completely
- 2 finger widths down from the acromion process; the bottom edge is at an imaginary line drawn from the axilla
- Injection site: 5cms below acromion process (Dougherty & Lister 2011)

7.3 Vastus Lateralis

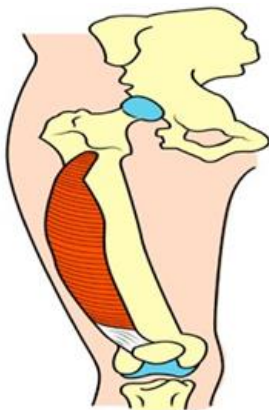



Fig 3: Vastus Lateralis Site

- Part of the quadriceps group, found on the anterior aspect of the thigh
- Stretches from the greater trochanter of the femur to the lateral condyle of the knee
- Ideal site as it is easily accessible and has no major blood vessels or nerves in the area (Dougherty and Lister 2011)

Our Lady's Children's Hospital, Crumlin		
Document Name: Guidelines on the Administration of Intramuscular and Sub-Cutaneous Injections		
Reference Number: AISCI-02-2017-NB-V3	Version Number: V3	
Date of Issue: February 2017	Page 6 of 21	



Identify greater trochanter and lateral femoral condyle. Identify the muscle position



Divide the muscle into thirds. The middle third = injection site




Inject medication in the middle third. Position: within the upper lateral quadrant of the thigh

Fig 4: Landmarking the Site

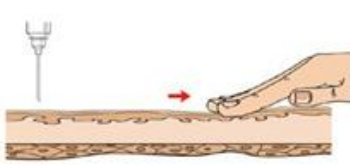
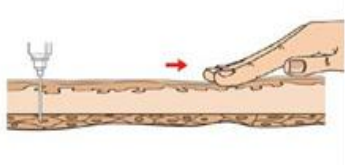
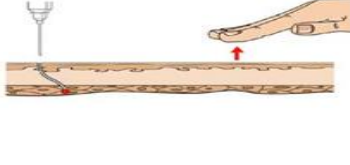
7.4 Selecting the injection site: Assess the following

Child's Size/Age	Under 2 years: vastus lateralis Over 3 years: deltoid
Muscle	Select a muscle that is accessible, well vascularised, well-developed. Is the muscle large enough to tolerate medication volume?
Frequency of Injections	Rotate sites to avoid fibrosis (Macqueen et al 2012) Review nursing documentation on sites used previously. Observe for any areas of fibrosis and avoid this site if present.
Medication, Manufacturer's instructions	Any specific requirements?
Safety	What position can the child maintain? Do you need another person to hold the child? Remove clothing and landmark the site.
Child/Parent's Preference	Consider their past experiences. Parents reported less distress with use of the deltoid site (Malkin 2008). Less pain was associated when children were sitting up and infants were held by parents (Taddio et al 2009).
Child's Position	Correct positioning may minimise anxiety or discomfort (Ford et al 2010). Positioning will also assist in accurate land marking of the site.

Our Lady's Children's Hospital, Crumlin		
Document Name: Guidelines on the Administration of Intramuscular and Sub-Cutaneous Injections		
Reference Number: AISCI-02-2017-NB-V3	Version Number: V3	
Date of Issue: February 2017	Page 7 of 21	

7.5 Z-Track Technique for Intramuscular Injection

This technique reduces pain and prevents complications associated with IM injections (Barron and Hollywood 2010). It displaces skin and SC layer from the muscle to be injected and seals off the needle track once the needle is removed (Dougherty and Lister 2011). For an uncooperative child, use of z-track technique may be difficult. **Clinical judgement is necessary** to ensure the safety of the child. **NOTE:** This technique is not advised for immunisations.

		
Gently pull the skin with your non-dominant hand, 1cm laterally to the injection site	Hold this position until the medication has been injected and the needle is removed	After removing the needle quickly, release the pull on the skin


7.6 Volumes for IM Injections: Individually assess the child and the medication to be injected. There is no universally accepted volume but a maximum of 2mls is suggested (Macqueen et al 2012).

7.7 Select Needle/Syringe: Select the smallest possible syringe that will accommodate the medication volume. Consider the needle length needed to ensure the medication reaches the muscle layer. **Individual assessment is needed**

Gauge: 23-25 gauge
Length: 25mm

7.8 IM Injection for children with bleeding disorders:

- Link with relevant medical team / CNS
- Factor replacement may be necessary prior to IM injection (NIAC 2013)
- Use a 25 gauge needle for children (NIAC 2013)
- Consider administering the medication by SC injection (NIAC 2013, DoH, UK 2013).
- Apply pressure to the injection site for 1-2 minutes after the injection (NIAC 2013)


Our Lady's Children's Hospital, Crumlin		
Document Name: Guidelines on the Administration of Intramuscular and Sub-Cutaneous Injections		
Reference Number: AISCI-02-2017-NB-V3	Version Number: V3	
Date of Issue: February 2017	Page 8 of 21	

7.9 Aspirating before IM Injection: may be based on custom and practice. Some literature continues to recommend this practice for IM injections but there is no research to support aspiration (Dougherty and Lister 2011). Individual child assessment and professional judgement are required as aspiration may not be necessary for all IM injections (D&T 2014). Aspiration may increase pain associated with injections (Canadian Agency 2014). It is not necessary to aspirate when administering immunisations (NIAC 2013, DoH, UK 2013).

8.0 Guidelines on the Administration of an IM Injection

Individual child assessment and clinical judgement is essential as there is no universal agreement on optimum site, needle size or injectable volumes.

Equipment
Appropriate needle and syringe
Plaster, if necessary
Sharps disposal bin
Child's Chart
Sublingual sucrose (if indicated)
Gloves, clean tray
Sterile gauze
Toys (for distraction)
Alcohol swab (if indicated)
IV tray
Medication
Medication sheet
immunisation record sheet/ book

Our Lady's Children's Hospital, Crumlin		
Document Name: Guidelines on the Administration of Intramuscular and Sub-Cutaneous Injections		
Reference Number: AISCI-02-2017-NB-V3	Version Number: V3	
Date of Issue: February 2017	Page 9 of 21	

ACTION AND RATIONALE

Preparation of the child:

1. Explain procedure to child/parents, to gain co-operation and trust and reduce anxiety.
2. Ensure privacy/dignity for the child throughout the treatment (OLCHC 2007)
3. If the infant/child needs to be clinically held, the local guideline is followed at all times (OLCHC 2009).

Reducing Pain:

1. Distraction is very effective in reducing pain /anxiety, involve the play specialist
2. Rubbing or stroking the skin close to the injection site
3. Rapid needle insertion and do not aspirate, if possible (NIAC 2013)
4. Infants **up to 6 months**: administer sublingual sucrose to reduce pain.
5. Offer soother to infant if appropriate as non-nutritive sucking enhances analgesic effect of sucrose (OLCHC 2010b)
6. Apply ice to numb the site, (GOSH 2013)

Preparation of Medication:

1. Gather equipment. Ensure it is intact, to prepare for the procedure.
2. Select a syringe size that is appropriate to the medication volume (Macqueen et al 2012).
3. Individual assessment of child to determine appropriate needle length and gauge.
4. Change needles after drawing up medication to ensure a clean needle for administration. This reduces irritation, pain and inadvertent administration of foreign particulate matter (Ford et al 2010)
5. Avoid the presence of air bubbles in injection syringes, to ensure accurate dosage
6. Administer all medication as per hospital/national policy (An Bord Altranais 2003, OLCHC 2001)

Select and Assess Injection site:

1. Assess injection site by observation and palpation. If any evidence of damage or trauma, do not use.
2. Identify and landmark the injection site
4. If administering more than one injection, use separate sites (NIAC 2013). If using one limb, allow a distance of 2.5cm between sites (NIAC 2013)

Positioning:


1. Position child to allow relaxation of the muscle to be used, to reduce pain/anxiety (Ford et al 2010).
2. Lie the infant down or ensure the child is seated.

Skin Disinfection:

1. Not required if the child is socially clean. Soap and water can be used if necessary (NIAC 2013).
2. If immunosuppressed: **do** require skin disinfection, to prevent infection (Malkin 2008)
3. If an alcohol swab is used, allow it to dry for 40 seconds prior to injection, to ensure alcohol is effective.

Administering an IM Injection:

1. Aseptic Non-Touch Technique (ANTT) level 3 throughout the procedure (OLCHC 2013). It is not

Our Lady's Children's Hospital, Crumlin		
Document Name: Guidelines on the Administration of Intramuscular and Sub-Cutaneous Injections		
Reference Number: AISCI-02-2017-NB-V3	Version Number: V3	
Date of Issue: February 2017	Page 10 of 21	

necessary to use gloves if the nurse's and patient's skin is intact (NIAC 2013).

2. Use the Z-track technique, if possible.

3. Use non-dominant hand to secure the injection site/tissue and use the dominant hand to inject the medication. This ensures control of the needle and syringe during the procedure (Barron and Hollywood 2010).

4. Hold syringe firmly between thumb and forefinger, with heel of hand resting on the thumb of the non-dominant hand. This ensures a 90-degree angle is achieved and the correct site is targeted (Ford et al 2010).

5. At the injection site: spread the skin taut between the thumb and forefinger. Infants or children with little muscle: skin can be bunched up (NIAC 2013)

5. Administer the injection as quickly as possible (that both the medication and the child will allow). This minimises injection time and discomfort (Ford et al 2010).

6. Insert needle smoothly and swiftly

7. Inject at a 90 degree angle, to ensure the medication reaches the muscle (Macqueen et al 2012, NIAC 2013)

8. Use clinical judgement to assess if aspiration is necessary (do aspirate if it is felt that injection site is near a blood vessel)

9. If blood is evident on aspirating, discard medication and syringe and prepare a new injection

10. Inject medication slowly: 1-2 seconds (NIAC 2013).

11. If possible, leave needle in place for 5-10 seconds after injecting medication, to allow surrounding tissue to expand and absorb the medication (Ford et al 2010). Use **clinical judgement** (child may be distressed /unable to hold their position safely).

12. After removing needle, use gentle pressure with sterile gauze. Do not rub injection site, to avoid discomfort (Macqueen et al 2012).

13. Leakage at injection site after withdrawal of needle: apply light pressure with gauze. A plaster may be applied.

Swift needle entry, slow injection of medication and swift needle withdrawal = less pain

After the injection:

- Dispose of equipment as per hospital policy, to ensure the safety of staff and children (OLCHC 2014, OLCHC 2011).
- Assess child during and after the procedure, documenting any adverse events, refer to medical team as appropriate.
- If the child is discharged after the injection, verbal advice is given to parent/carer.
- Record the medication administration as per hospital policy, including which site was selected

9.0 SC Injections

- Slower absorption than the IM route as SC tissue has less blood supply (Dougherty and Lister 2011)
- Absorption rate depends on site (Barron & Hollywood 2010)
- It is appropriate for certain drugs, e.g. heparin, insulin
- May use an automatic injection device or pen
- Maximum volume = 2mls (Macqueen et al 2012)

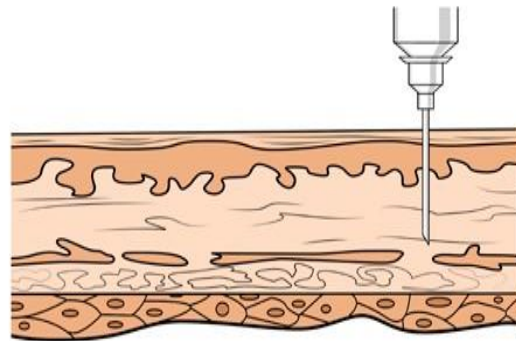


Fig. 5: Subcutaneous injection

Many available sites as SC tissue is found all over the body

- Sites include:
 - **Upper thigh**
 - **abdomen**
 - **upper arm**
 - **buttocks**
- Sites must be rotated to prevent fibrosis and ensure adequate absorption (Macqueen et al 2012)
- Often self-administered, education and support is essential

SAFETY: Insulin must be administered in insulin syringes, to ensure accurate dosage (Macqueen et al 2012)

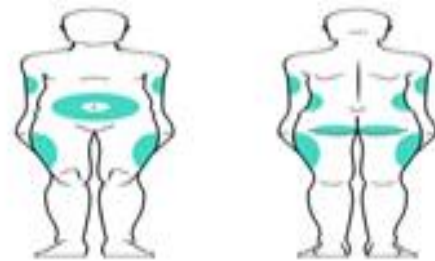
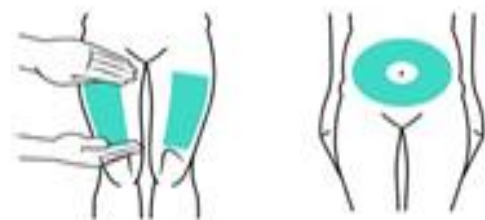



Fig 6: Injection Sites for SC Injections



Our Lady's Children's Hospital, Crumlin		
Document Name: Guidelines on the Administration of Intramuscular and Sub-Cutaneous Injections		
Reference Number: AISCI-02-2017-NB-V3	Version Number: V3	
Date of Issue: February 2017	Page 12 of 21	

Recommended Gauge & Length of Needle for SC Injections (NIAC 2013)

- Gauge: 23-25 gauge
- Length: 16mm


Note: insulin syringes have shorter needle length (appendix 3).

Insulin Administration: needle length of 6mm is adequate (FIT 2011, GOSH 2013)

Always Use Insulin Syringe

9.1 Guidelines on the Administration of a SC Injection:

Individual assessment and clinical judgement essential: no universal optimum site, needle size or volumes.

Our Lady's Children's Hospital, Crumlin		
Document Name: Guidelines on the Administration of Intramuscular and Sub-Cutaneous Injections		
Reference Number: AISCI-02-2017-NB-V3	Version Number: V3	
Date of Issue: February 2017	Page 13 of 21	

Equipment: as per IM

ACTION AND RATIONALE
as per IM guideline, specific information related to SC below

1. For regular injections: ensure rotation of sites
2. Use of alcohol swab not necessary, repeated use may harden skin (GOSH 2013)
3. Gently bunch up the skin, avoids injection into muscle
4. (Macqueen et al 2012)
5. Insert the needle at 45 or a 90 degree angle, depending on
6. needle length and size of child (Macqueen et al 2012)

Needle should be short enough so that the medication does not reach the muscle layer

90° angle: for all ages (Barron and Hollywood 2010) and insulin administration (Dougherty and Lister 2011)

45° angle: needle length > 8mm or children with little SC tissue

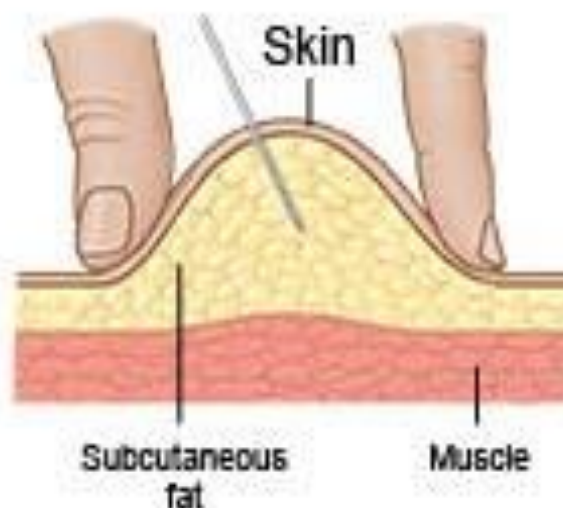
5.Inject the medication slowly (for example: count from 1- 10)

6.Unnecessary to aspirate prior to injecting as it is unlikely to reach blood vessels (NIAC 2013, Dougherty and Lister 2011)

Subcutaneous Injection



Pinch and inject



Swift needle entry, slow injection of medication and swift needle withdrawal = less pain

9.2 Auto Injectors

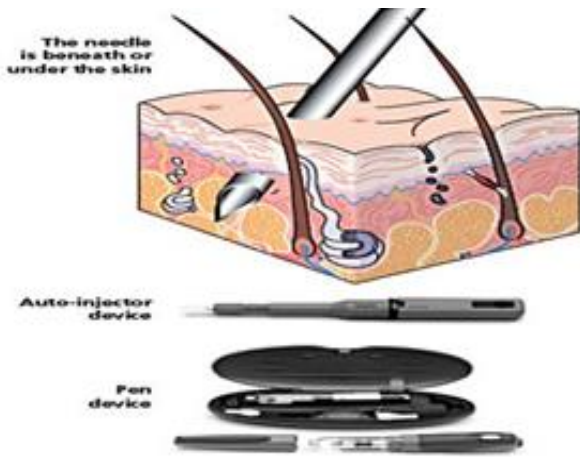


Fig. 8: Use of an automatic injection device for Sc injection




Fig. 9: Automatic injection device

- Needle angle is 90 degrees
- Refer to manufacturer's instructions and CNS

10.0 Specific Care when Administering an Immunisation

Equipment: as per IM

- Resuscitation equipment, appropriate refrigerated immunisation storage
- HSE consent, and infant hospital prescription
- HSE immunisation leaflet given to parent prior to immunisation

Our Lady's Children's Hospital, Crumlin		
Document Name: Guidelines on the Administration of Intramuscular and Sub-Cutaneous Injections		
Reference Number: AISCI-02-2017-NB-V3	Version Number: V3	
Date of Issue: February 2017	Page 15 of 21	

ACTION AND RATIONALE as per IM guideline, specific information related to immunisations below. Refer to *Immunisation Guidelines for Ireland (2013)*, for immunisation specific information

- 1) Assess the child's suitability for immunisation, to ensure safety (history of allergies, reactions, contraindications). Refer to national guidelines for accepted contraindications (NIAC 2013)
- 2) Avoid prophylactic use of anti-pyretics (paracetamol and ibuprofen, they may reduce antibody response (NIAC 2013)
- 3) Ensure consent has been obtained (OLCHC consent form and consent section of the Primary Childhood Immunisation Record Form).
- 4) Always use a new needle to administer the immunisation, unless immunisation is supplied with a prefilled needle/syringe attached (DoH, UK 2013)
- 5) Sites for SC injection of immunisations are: vastus lateralis and deltoid (NIAC 2013)
- 6) Any leakage of immunisation from the syringe during the administration would provide an insufficient dose: another dose should be given at a different site (NIAC 2013)
- 7) Z- track technique not advised, aspiration not necessary (NIAC 2013)
- 8) Documentation includes immunisation record book (from parents) and Primary Childhood Immunisation Record Form.
- 9) Return these forms as indicated to ensure accurate and updated records. Documentation within the child's medical record should include: batch number, dosage, injection site and patient response.
- 10) Observe the child for 15 minutes post-immunisation and discharge home if no evidence of any side-effects. Children with a history of allergies may be observed for longer.
- 11) Pre-term infants: monitor for 4hrs after the immunisation, due to increased risk of apnoea and bradycardia (NIAC 2013).
- 12) Advice on potential side-effects for individual immunisations and their management should be explained to parents / guardians and written leaflet given.


11.0 Comparison Documents

An Bord Altranais (2003) *Guidance to Nurses and Midwives on Medication Management*, An Bord Altranais: Dublin.

Our Lady's Hospital for Sick Children (2001) *Administration of Medication Policy*, Our Lady's Hospital for Sick Children: Dublin.

12.0 Implementation Plan: Communication and Dissemination

- Guidelines available on hospital intranet
- Hard copies of the guidelines will be included in the Nurse Practice Guideline Folder in each clinical area
- Information will be circulated in NPDU Newsletter

Our Lady's Children's Hospital, Crumlin		
Document Name: Guidelines on the Administration of Intramuscular and Sub-Cutaneous Injections		
Reference Number: AISCI-02-2017-NB-V3	Version Number: V3	
Date of Issue: February 2017	Page 16 of 21	

Training

- Education will be delivered within clinical areas that using existing educational resources, e.g. Clinical Nurse Facilitators
- Development of an educational programme in the CCNE and on the OLCHC intranet

13.0 Monitoring and / or Audit

Feedback from nursing staff on the guidelines to contribute to ongoing guideline development

14.0 References

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Our Lady's Children's Hospital, Crumlin		
Document Name: Guidelines on the Administration of Intramuscular and Sub-Cutaneous Injections		
Reference Number: AISCI-02-2017-NB-V3	Version Number: V3	
Date of Issue: February 2017	Page 17 of 21	

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Our Lady's Children's Hospital, Crumlin		
Document Name: Guidelines on the Administration of Intramuscular and Sub-Cutaneous Injections		
Reference Number: AISCI-02-2017-NB-V3	Version Number: V3	
Date of Issue: February 2017	Page 18 of 21	

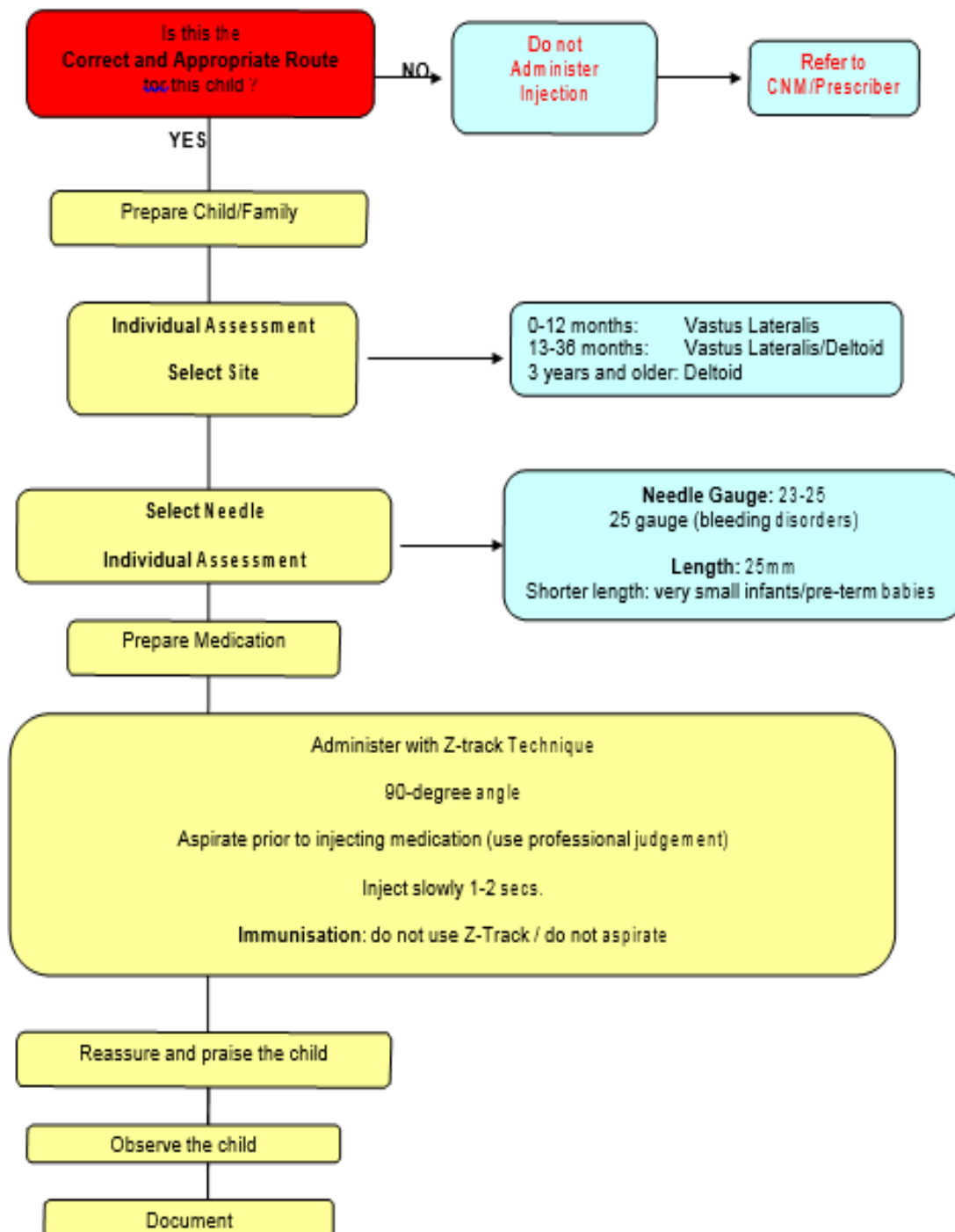
http://wps.prenhall.com/chet_wilson_drugguides_1/0,5513,403564-,00.html

Fig 7, <http://www.drugs.com/cg/how-to-give-a-subcutaneous-injection.html>

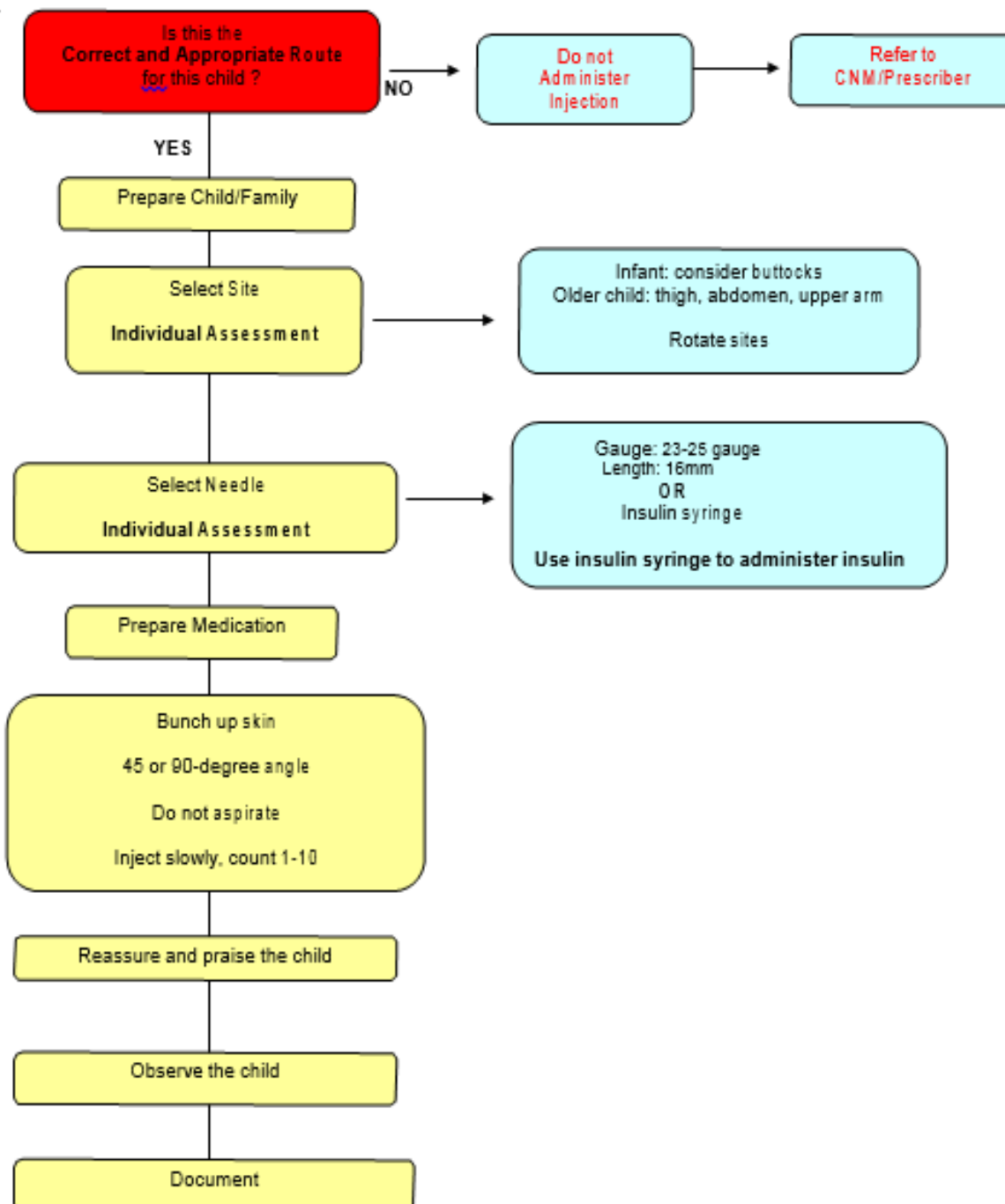
Fig.8, 9:


<http://www.gosh.nhs.uk/medical-conditions/medicines-information/giving-subcutaneous-injections/>

15.0 Appendix 1: Quick Guide: Administering an IM Injection



16.0 Appendix 2: Quick Guide: Administering a SC Injection



Our Lady's Children's Hospital, Crumlin		
Document Name: Guidelines on the Administration of Intramuscular and Sub-Cutaneous Injections		
Reference Number: AISC-02-2017-NB-V3	Version Number: V3	
Date of Issue: February 2017	Page 21 of 21	

17.0 Appendix 3

Available Needles in OLCHC

STANDARD NEEDLES		
Needle Colour	Gauge	Needle Length
Green	21	1 ½ " or 40 mm
Blue	23	1 ¼ " or 30 mm
Orange	25	5/8" or 16 mm
Orange	25	1 " or 25mm

Table 3: Needle Gauge and Length

INSULIN NEEDLES		
Units	Gauge	Needle Length
30	30	8mm
50	29	12.7mm
100	29	12.7mm

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