

# MEDICATION ADMINISTRATION

## PRACTICE GUIDELINE<sup>®</sup>

### DOCUMENT SUMMARY/KEY POINTS

This document covers the general principles of medication administration within SCHN for most routes of delivery including oral, enteral, rectal, vaginal, and topical, by injection or by infusion.

- This document is to be read in conjunction with:
  - Medication Handling in NSW Health Public Health Facilities ([PD2022\\_032](#))
  - Medication delivered by inhalation: Inhaled Medication: Administration - SCHN
  - [Hazardous Medications – Administration and Handling](#) – SCHN
  - [Medication administration by parents and carers or self-medication by a young person](#) - SCHN
  - Injectable medications, fluids and lines must be labelled in accordance with the Australian Commission on Safety and Quality in Health Care (ACSQHC) [National Standard for User-applied Labelling of Injectable Medicines Fluids](#)
  - All intravenous medications must be administered in accordance with the SCHN [Paediatric Injectable Medications Handbook](#)
  - Preparation of pharmaceutical and advanced therapeutic products ([PD2023\\_021](#))

This document supports the oversight of compliance with National Safety and Quality Health Service (NSQHS) Standards - Medication Safety Standard.

This document reflects what is currently regarded as safe practice. However, as in any clinical situation, there may be factors which cannot be covered by a single set of guidelines. This document does not replace the need for the application of clinical judgement to each individual presentation.

<b>Approved by:</b>	SCHN Policy, Procedure and Guideline Committee	
<b>Date Effective:</b>	1 <sup>st</sup> December 2023	<b>Review Period:</b> 3 years
<b>Team Leader:</b>	Director of Nursing	<b>Area/Dept:</b> CHW Nursing

## CHANGE SUMMARY

- Procedures removed from document and Local Work Procedures (LWP) developed.
- Clinical Skills Assessment (CSA) for Administration of IV Therapy to be completed once, at commencement of employment. (a change from previous policy of biennial).
- **20/11/23:** Minor review to update frequency of IV Admin CSA completion to once only, at commencement of employment.

## READ ACKNOWLEDGEMENT

Outline who needs to read or know about the document (roles only – do not use names).

Outline using ONE of the following requirements:

- **Training/Assessment Required** – All Registered Nurses and Enrolled Nurses, employed by the SCHN (including those employed on the casual pool) where required to administer intravenous medication, are required to undertake a medication assessment on commencement (or once), as well as completing eLearning– 'Fundamentals of paediatric medication safety' found in My Health Learning before they can check or administer medications.
- **Training/Assessment Required** - All nursing staff working in clinical areas are required to successfully complete the [Clinical Skills Assessment \(CSA\) Administration of IV Therapy](#) once, at commencement of employment.
- All nursing staff working in clinical areas should **read and acknowledge** [NSW Health Policy Directive - Medication Handling PD2022\\_032](#)
- Medical staff and Pharmacists should **read and acknowledge** [NSW Health Policy Directive - Medication Handling PD2022\\_032](#)

This document reflects what is currently regarded as safe practice. However, as in any clinical situation, there may be factors which cannot be covered by a single set of guidelines. This document does not replace the need for the application of clinical judgement to each individual presentation.

<b>Approved by:</b>	SCHN Policy, Procedure and Guideline Committee	
<b>Date Effective:</b>	1 <sup>st</sup> December 2023	<b>Review Period:</b> 3 years
<b>Team Leader:</b>	Director of Nursing	<b>Area/Dept:</b> CHW Nursing

# TABLE OF CONTENTS

<b>Introduction</b> .....	<b>4</b>
<b>Principals of Safe Medication Administration</b> .....	<b>4</b>
Independent Second Person Checks: .....	4
Aseptic Non-Touch Technique - ANTT® 4 .....	6
Compatible Fluids .....	7
How to Prevent Coring of Sterile Vials .....	7
<i>Before Puncturing the Vial</i> .....	8
<i>Proper Aseptic Technique to Prevent Coring of Sterile Vials</i> .....	8
<b>Nursing Grade – Checks and Administration Guide</b> .....	<b>10</b>
<i>Table 1. Checking Requirement and Administration Guide</i> .....	10
<b>Medications to be administered by a Medical Officer</b> .....	<b>11</b>
<b>Routes of Administration</b> .....	<b>12</b>
Oral Administration .....	12
<i>Tips for Administration of Oral medications:</i> .....	12
Gastrostomy & naso/orogastric or naso/gastro jejunal tubes .....	13
Rectal Medications .....	13
Vaginal Medication .....	14
Intravenous Medications (non-hazardous) .....	14
Slow-Push Intravenous Medication Administration .....	15
Intramuscular (IM) Medication .....	15
<i>Table 2. Recommended needle size, length and angle for administering vaccines<sup>5</sup></i> .....	16
<i>Sites for injections</i> .....	16
<i>Table 3. Intramuscular Medication Administration Volumes<sup>5</sup></i> .....	18
Subcutaneous Medication Administration .....	19
<i>Tip for administering medication subcutaneously</i> .....	20
Subcutaneous Injection via an Indwelling Subcutaneous Catheter .....	20
<b>References and Bibliography</b> .....	<b>21</b>

## Introduction

The Sydney Children's Hospitals Network (SCHN) prioritises the safe management, monitoring and administration of medication by ensuring the following:

- Correct prescribing of medication.
- Administration of the correct medication.
- The correct patient receives the prescribed medication.
- Administration of the prescribed dose.
- Administration of the medication dose by the correct route.
- Administration of each dose of medication at the correct time
- Administration of parenteral medication in the correct dilution and at the correct rate.
- Safe storage of medication.
- Patient safety is maintained and monitored.
- Implementation and adherence to legislative provision of the *Poisons and Therapeutic Goods Act 1966*<sup>1</sup> and NSW Health guidelines.
- Ensure an effective independent double check is part of the medication administration procedure.

Guidelines produced by the Australian Pharmaceutical Advisory Council (2005) identify principles on which these standards of practice have been broadly based.

This is a practice guideline for use within the network. It is based on the [NSW Health Policy Directive - Medication Handling PD2022\\_032](#)

Refer to page 89 of PD2022\_032 as to which health care workers are qualified to administer medications.

## Principals of Safe Medication Administration

### Independent Second Person Checks:

Is an important medication safety strategy. To be effective, a second person check must be conducted independently by the second person to reduce the risk of bias that occurs when the person preparing and checking the medication is likely to see what they expect to see, even if an error has occurred. An independent second person check requires two people to separately check each component of selecting, preparing and administering a medication. Two people are unlikely to make the same mistake if they work independently. If they work together or influence the checking procedure by suggesting what the checker should find, both could follow the same path to error. When performed correctly, independent second person checks have been found to detect 95% of errors<sup>2,3</sup>.

- A video demonstrating how to conduct an independent second person check is available at My Health Learning within the Safe Use of High-Risk Medicines module.
  - **Course Code:** 214583697.
- When conducting an independent second person check, each person must independently follow the procedure steps below:
  - **Product selection:**
    - Confirm the selection of the correct medication and fluid.
  - **Preparation:**
    - Confirm that the dose is appropriate and the calculations are correct.
    - Confirm that the dose is being administered using the correct route and at the correct time.
    - When in use, check that the rate limiting device, for example, infusion pump, is correctly set.
  - **Administration:**
    - Confirm the identity of the patient prior to administration (at the bedside or with the patient present) and in accordance with facility procedures.
  - **Documentation:**
    - Document the administration, preferably in the same record, in accordance with facility procedures.

All staff must refer to the medical officer's prescription when administering medication therapy. Staff do not have a role in administration of medication to anyone other than patients of the SCHN. Clinicians administering medication are responsible for ensuring that they are aware of any drug sensitivities or allergies, drug actions and interactions as well as the appropriate manner in which to safely administer the medication.

To administer a prescribed medication safely and effectively at a minimum the 5 principles of '**medication rights**' must be ensured:

- **Right Medication:** The prescription must be reviewed prior to the administration of each medication. This should ensure that the prescribed medication is consistent with the patient's condition, no therapeutic duplications have been prescribed and/or administered, and allergies and/or drug reactions to the medication have been considered. Check the name of the drug, that it is the correct form and has not expired.
- **Right Patient:** Check the patient's name and MRN on the identification arm bands against the electronic Medical Management (eMM) system or medication chart (during downtime procedure). In an outpatient area check with the parent and confirm the child's date of birth. In mental health unit check against photo. Check for any allergies or previous drug reactions.

- **Right Dose:** Check the appropriate dose has been prescribed, using an approved resource. Calculate the correct dose; ensuring independent double checking occurs where two people are required, i.e. calculation formula:

$$\frac{\text{Stock required}}{\text{Stock strength}} \times \text{Volume}$$

- **Right Route:** Ensure the route of administration prescribed is correct and meets the needs of the patient (for example, Nasogastric, PEG, Oral, etc.). Make sure you have chosen the correct dose form for that route. Ensure oral liquid doses are drawn up in an oral syringe.
- **Right Time:** Check that the prescription is current and valid; ensure the drug has not been given or ceased, check the dates, times and that the medication concurs with the prescribed frequency. This is particularly important if a patient is transferred from another ward, ED or Operating Theatres.

Additional medication rights to be followed are:

- **Right Documentation:** Ensure that the medication order is signed for post administration of the medication.
- **Right Reason:** Confirm why the patient is taking this medication.
- **Right Response:** There is an appropriate response to the medication and adverse events are monitored.

It is important to remember that patient safety is paramount during any medication administration procedure. Therefore, ensure all items of equipment taken to the bedside are taken away at the end of the procedure and discarded appropriately (including cannula caps).

**MEDICATION DOSES ARE NEVER TO BE LEFT AT THE BEDSIDE FOR ADMINISTRATION LATER.**

## Aseptic Non-Touch Technique - ANTT® 4

ANTT® is a technique used to prevent contamination of key parts and key sites by microorganisms that could cause infection. In ANTT®, asepsis is ensured by identifying and then protecting key parts and key sites by hand hygiene, non-touch technique, using new sterilised equipment and/or cleaning existing key parts to a standard that renders them aseptic prior to use<sup>2</sup>. Principles of ANTT® must be adhered to whenever the CVAD is accessed.

- Essential components of ANTT® include:
  - i. Identifying and protecting key parts and sites:
    - **Key part:** is the part of the equipment that must remain sterile, such as a syringe hub, and must only contact other key parts or key sites.
    - **Key site:** is the area on the patient such as a wound, or IV insertion site that must be protected from microorganisms.

- ii. Use hand hygiene, non-touch technique, a defined aseptic field, sterile equipment and clean existing key parts prior to use.
- iii. Attempt not to touch key parts/sites directly, WEAR STERILE GLOVES during procedures where touch of key parts/sites may occur to reduce contamination risk.
- iv. Utilise a defined aseptic field to provide a controlled working space that ensures and promotes asepsis.
- v. Sequence your practice to ensure efficient, logical and safe order of tasks.

**CVAD: A Central Venous Access Device:** is an intravascular device whose catheter tip is situated in the superior vena cava, inferior vena cava or right atrium.

**PICC: Peripherally Inserted Central Catheter** are inserted in the cephalic or basilic vein in the antecubital region and advanced through to the central circulation.

Refer to [SCHN ANTT Policy](#) for more details.

## Compatible Fluids

Medicines compatibility with commonly used IV fluids are listed where published compatibility data exists. If an IV fluid is not listed in the monograph as compatible, do NOT use this fluid to further dilute or administer the medicine.

- If a medicine is compatible in single component IV fluids e.g. glucose 5% and sodium chloride 0.9%, it does not infer that it is compatible in a combination IV fluid of the individual component IV fluids e.g. sodium chloride 0.9% with glucose 5%.
- The "Solution" tab of IV compatibility on Micromedex will list the compatible solutions. Click the individual solution to obtain further information of the concentration, duration and conditions under which the individual medicine is compatible.
- Compatibility of medicines with IV fluids is for 24 hours, unless otherwise indicated. Consult the pharmacist if further information is required.

## How to Prevent Coring of Sterile Vials

- Coring is when a small piece of a vials rubber stopper breaks off and contaminates the contents of a sterile vial. It can typically be noticed floating on top of or inside the medication or stuck to the inside wall of the vial. This small foreign body can then be aspirated into a syringe and injected into a patient.
- The contamination of parenteral fluids and medications by particulate matter has been recognized as a potential health hazard and has been associated with adverse reactions ranging from clinically occult pulmonary granulomas detected at autopsy to local tissue infarction, pulmonary infarction, and death.
- Due to the small size of any potential cores, this may go unnoticed as staff are generally not able to easily visualise these, with other factors such as product labels, coloured vials and backgrounds all contributing to the difficulty in recognising coring.

- Although coring is most likely a low-frequency event, other reports of coring, as well as patent applications for needles that prevent coring, suggest that coring continues to occur and is a problem that has not been completely solved.
- Following the recommended techniques and using the proper size equipment when puncturing a vial, can reduce the risk for coring.

### ***Before Puncturing the Vial***

Intravenous medications should be drawn up in a designated clean medication preparation area that is not adjacent to potential sources of contamination, including sinks or other water sources. Water can splash or spread as droplets more than a meter from a sink. In addition, any item that could have come in contact with blood or body fluids, such as soiled equipment used in a procedure, should not be in the medication preparation area.

- Examples of contaminated items that should not be placed in or near the medication preparation area including used equipment such as:
  - Syringes
  - Needles
  - IV tubing
  - Blood collection tubes
  - Needle holders
- The medication preparation area should be cleaned and disinfected on a regular basis, and any time there is evidence of soiling.
- There should be ready access to necessary supplies (such as alcohol-based hand rub, needles and syringes in their sterile packaging, and alcohol wipes) in the medication preparation area to ensure that staff can adhere to aseptic non-touch technique.
- From an infection control perspective, the safest practice is to prepare an injection as close as possible to the time of administration to the patient. This is to prevent compromised sterility (i.e., microbial contamination or proliferation) or compromised physical and chemical stability (e.g., loss of potency, adsorption to the container) of the medication when it is transferred outside of its original container and stored for a period of time before administration.
- Knowing the parts of a syringe and needle is crucial, not only for proper injection techniques but also to keep an aseptic field before injecting a medication.

### ***Proper Aseptic Technique to Prevent Coring of Sterile Vials***

- Proper hand hygiene should be performed before handling medications, and the rubber top should be disinfected 2% Chlorhexidine and Alcohol Swab (Aligning with ANTT) containing swab and allow the alcohol to dry following removal of the plastic cap and prior to piercing the rubber top.
- At SCHN, blunt fill needles are used to reduce the risk of coring and needle stick injuries.



- To prevent vacuum formation, inject air into the vial equal to the volume to be withdrawn. When reconstituting a powdered IV drugs, withdraw a volume of air equal to the amount of the diluent to be added. This will prevent positive pressure from developing inside the vial.
- Inspect the medication-filled syringe and the vial from which the medication was drawn for any signs of coring, small flecks, or pieces of the rubber stopper.

## **Reminders**

### **Single-Dose Vials:**

- Are not designed for entry on multiple occasions.

### **Ampoules:**

- Must be discarded after opening and not stored for any period of time.
- Consider using Blunt Fill Needle with Filter to prevent glass particles from entering the syringe.
  - *Request from Pharmacy or local product manager.*

### **Multi-Dose Vials:**

- Contain one or more antimicrobial preservatives and are designed for entry on multiple occasions.
- Discard within 28 days of initial entry, unless otherwise specified by the manufacturer.

## Nursing Grade – Checks and Administration Guide

The following table constitutes who can check with whom after completion of the “*Fundamentals of paediatric medication safety*” in My Health Learning. All Registered and Enrolled Nurses employed by SCHN where required to administer intravenous medication, are required to undertake a medication assessment on commencement (or once), as well as completing the Fundamentals of paediatric medication safety on My Health Learning to administer any medication. An **authorised SCHN checker** is a permanent employee (RN or EN) that has completed the above learning and assessment (this includes Pool staff).

**Table 1. Checking Requirement and Administration Guide**

Nurse grade	Can they check?	Check with whom	Can they administer?
AIN/Undergraduate	<b>No</b>	<b>N/A</b>	<b>No</b>
Nursing students	<b>Yes</b> - Via all routes (ward dependant).  Under the direct supervision of 2 RNs -Excludes S8 medications	2 authorised SCHN checkers <ul style="list-style-type: none"> <li>one must be an RN</li> <li>Nursing Students are the Third checker</li> </ul>	<b>Yes</b> – the 2 authorised SCHN checkers must go to the bedside and the student nurse can administer under direct supervision (excluding Bolus medications)
Trainee Enrolled nurse	<b>Yes</b> Under the direct supervision of 2 RNs	2 authorised SCHN RNs	<b>Yes</b> – 2 SCHN authorised checkers - one must be an RN, the Trainee Enrolled nurse is the third checker
Enrolled nurse	<b>Yes</b> - in accordance with scope of practice for ENs  i.e. Can check Cannot administer S8/ S4D or SC medications	An authorised RN from SCHN  Not with: <ul style="list-style-type: none"> <li>GradStart for their first 6 months</li> <li>ENs</li> </ul>	<b>Yes, with exception</b> An EN cannot administer: <ul style="list-style-type: none"> <li>Nurse initiated medication without confirmation of the supervising nurse</li> <li>S8 medication</li> <li>Standing orders</li> <li>Inotropes</li> <li>IV additives to IV fluids</li> <li>IV hazardous medications</li> <li>High dose Potassium</li> </ul> <b>Transfusions:</b> <ul style="list-style-type: none"> <li>An EN can attend to pre transfusion check with an RN and monitor patients receiving blood product, after completion of Bloodsafe eLearning.</li> <li>An EN cannot administer blood products</li> <li>See <a href="#">Transfusions of Blood and Blood Components Practice Guideline</a>.</li> </ul>
Agency RNs	<b>Yes</b>	An authorised SCHN RN	<b>No</b>
Pool RN	<b>Yes</b>	An authorised SCHN RN, with > 6 months experience at SCHN	<b>Yes</b> - All RNs must complete IV CSA and Fundamentals of Paediatric medication safety  Administration of opioid medications require relevant CSA to be completed.
GradStart RN	<b>Yes</b> - Can check S8/S4D including opioids and epidurals when deemed competent by the ward.  Can check S8/ S4D as part of scope	An authorised SCHN RN  For the first 6 months of employment cannot check with: <ul style="list-style-type: none"> <li>EN</li> <li>GradStart nurse</li> </ul>	<b>Yes</b> Administration of opioid medications require relevant CSA to be completed.  -Cannot administer nurse-initiated medications within first 6 months (LWP may exist for specific areas where accreditation packages are undertaken)
Registered nurse (RN)	<b>Yes</b>	All nursing grades	<b>Yes</b> - All RNs must complete IV CSA and Fundamentals of Paediatric medication safety <ul style="list-style-type: none"> <li>Administration of opioid medications require relevant CSA to be completed</li> </ul>

## Medications to be administered by a Medical Officer

Medications prescribed for administration via the following routes must be given by a medical officer or otherwise authorised clinician within their scope of practice:

- Intrathecal
- Intraventricular
- Intralesional
- Intrapleural
  - Except for the administration of Intrapleural Urokinase – Nurses must successfully complete the CSA: Chest Drain Management.
- Intravitreal
- Intracameral

There may be circumstances where other medications, including via the intravenous route, may require a medical officer to be present during the administration of the first or all doses. It is expected staff practice within their scope of practice with relation to the administration of all medications, and if required, seek clarity from the treating team, a senior colleague or pharmacy.

## Routes of Administration

### Oral Administration

#### Standard

- All oral medications must be administered in accordance with policies, procedures and guidelines for administration of medication within SCHN, including Ministry of Health and SCHN documents.
- Oral/enteral medications, given by syringe, may only be administered using purpose specific oral syringes.
- Where an individual patient needs require the administration of medication to children via an oral syringe and this is unsuccessful, alternatives include: a medication cup; or plastic spoon. The medication is first measured in an oral syringe and transferred to the medication cup or spoon for administration.

#### Procedure

1. Perform hand hygiene.
2. Review medication order and ensure the minimum 5 principles of 'medication rights' are adhered to.
3. Use a dedicated oral use only syringe to withdraw required amount of liquid OR dispense required tablet.
4. Ensure the child or infant is in a comfortable and upright position prior to administration of medication.
5. Perform hand hygiene.
6. Document administration.

#### ***Tips for Administration of Oral medications:***

- Administration of oral medications prior to feeding may reduce the risk of vomiting medication; however, some medications should be given with food.
- When administering oral medications with a syringe, care should be taken to gently deliver the medication into the inner aspect of the cheek slowly, allowing the child or infant to swallow small amounts.
- When administering liquid oral medications, an oral syringe should be used to measure the calculated volume of liquid for administration. If the child is unable to swallow tablets refer to pharmacy to clarify if the medication can be crushed and mixed with water, or an alternative product is available. Medications are not to be mixed with large quantities of food or formula, e.g., a whole meal, as if the food/formula is not completely consumed, the dose administered will be inaccurate.
- Staff may consult "Don't rush to crush" available via MIMS through CIAP for guidance on manipulating solid dosage forms including tablets and capsules.

## Gastrostomy & naso/orogastric or naso/gastro jejunal tubes

### Standard

Ensure that tube placement is confirmed prior to administration and is flushed prior to and following each medication. The amount of water used will depend on the age of the child and if they are on a fluid restriction.

- Infants 3-5 mL
- Children 5-15 mL
- Adolescents 10-30 mL

Medications should not be mixed with formula.

For children who have a gastrostomy, medications should always be given through attached feeding tube.

Do not syringe medications directly into the gastrostomy as it damages the anti-reflux valve mechanism in the device.

Refer to [Local Work Procedure for Administration through Gastrostomy & naso/orogastric or naso/gastric jejunal tubes](#)

## Rectal Medications

**NOTE:** The rectal route of medication administration may be used for some medications when the enteral route is difficult or contraindicated.

Limitations of rectal route of administration include:

- Variable absorption.
- Evacuation/expulsion of the medication.
- Acceptance of administration via this route may be culturally influenced.
- Generally disliked by children.
- Neutropenic children should NEVER receive rectal medications – due to the increased risk of infection.
- Caution should be taken in children with thrombocytopenia, severe coagulopathy or lower gastrointestinal bleeding – due to increased risk of bleeding.

**Note:** a size 8 feeding tube may be too large for some neonates particularly premature and low birth weight infants – size 6 may be more appropriate for this patient population. **DO NOT** cut feeding tube.

Refer to [Local Work Procedure for Rectal Administration](#)

## Vaginal Medication

When a vaginal medication is given, 2 nurses must be present (of which one must be female) to ensure the child or young person and staff are not left vulnerable particularly in relation to child protection issues. The following principles will ensure patient dignity and safety:

- Ensure privacy and comfort whenever a vaginal medication is given.
- Explain clearly what is happening to the child, parent or caregiver.
- Always use a water soluble lubricant on the suppository, or tip of a catheter etc.
- Slowly introduce the medication into the vagina; it should not be forced.
- There may be specific instructions for individual patients.

## Intravenous Medications (non-hazardous)

### Standard

All intravenous medications must be administered in accordance with this document and NSW Health Policy PD2022\_032

- Nurses who have demonstrated successful completion of Administration of IV Therapy Clinical Skills Assessment, may check and administer non-hazardous intravenous medications.
- All powdered intravenous antibiotics must be reconstituted in accordance with the [SCHN Paediatric Injectable Medications Handbook](#).
- Intravenous medication should be prepared immediately prior to administration using ANTT.
- All intravenous medications must be administered in accordance with the SCHN Paediatric Injectable Medications Handbook. In particular, the compatibility of the intravenous solution to which the intravenous medication is to be added, the volume in which the intravenous medication is to be infused, and the time and rate required to administer the medication must be checked independently by both persons involved in the medication administration process.
- Coring is when a small piece of a vials rubber stopper breaks off and contaminates the contents of a sterile vial. Refer to [Prevent Coring of Sterile Vials](#)

All medicines and fluids removed from the original packaging must be labelled in accordance with the [ACSQHC's National Standard for User-applied Labelling of Injectable Medicines Fluids and Lines](#).

All intravenous solutions to which medications have been added must be accurately and adequately labelled with:

- Patient name, date of birth and medical record number
- Name and dose of medication
- Name and volume of intravenous fluid
- Date and time of addition

- Signatures of the persons checking and administering
- Route of administration (where not specified by words and colour)
- Staff should refer to the principals of [Safe Medication Administration](#)

When intravenous medications are administered by an accredited nurse in the community, it is acknowledged that a second person may not be available at the point of administration to check the medication and its preparation immediately prior to administration. In this instance, a check of the medication, administration fluid, and dosage calculation should be made by a second accredited nurse, medical practitioner or pharmacist before leaving to visit the client.

Refer to [Local Work Procedure for Administration of an Intravenous medication via burette or syringe pump driver](#)

## Slow-Push Intravenous Medication Administration

### Standard

Nurses administering drugs as a slow intravenous push must adhere to the SCHN Paediatric Injectable Handbook.

Refer to [Local Work Procedure for Slow-Push Intravenous Medication Administration](#)

## Intramuscular (IM) Medication

### Standard

It is recognised that the administration of intramuscular (IM) medications may be an unpleasant procedure for children and their families. Wherever possible, the use of the IM route for administration of medication should be avoided. To avoid the risk of local neural, vascular or tissue injury the IM injection should be given deep into the muscle mass. The needle used for IM injections should be long enough to reach the substance of the muscle. The following principles apply for IM injections:

- Do not use the same needle the solution has been drawn up with – change needles prior to administration.
  - Exception when the needle cannot be detached from the syringe due to manufacturing.
- Use needles no longer than 2.5cm
- Aspiration is no longer necessary when inserting the needle.
  - However, if you have done this and a flash of blood appears in the needle hub, withdraw the needle and select a new site.

**Table 2. Recommended needle size, length and angle for administering vaccines<sup>5</sup>**

Age or size of person to be vaccinated	Needle type	Angle of needle insertion
Infant, child or adult for intramuscular vaccines	22–25 gauge, 25 mm long	90° to skin plane
Preterm infant (<37 weeks gestation) up to 2 months of age, and/or very small infant	23–25 gauge, 16 mm long	90° to skin plane
Very large or obese person	22–25 gauge, 38 mm long	90° to skin plane
Subcutaneous injection in all people	25–27 gauge, 16 mm long	45° to skin plane
Intradermal injection in all people	26–27 gauge, 10 mm long	5-15° to skin plane

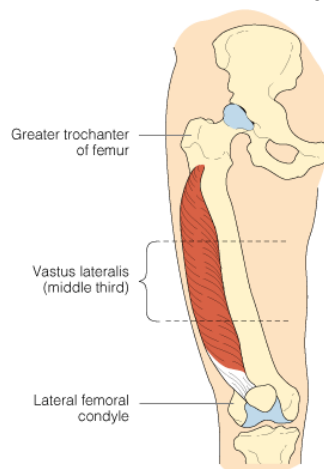
*Australian Immunisation Handbook, Australian Government Department of Health, Canberra, 2021*

### Sites for injections

- Clearly identify the site of injection
- The dorsogluteal site should be avoided in children less than 2 years because of immature anatomical structures which may lead to complications.
- Intramuscular injections must not be administered into a site where skin is inflamed, oedematous, irritated or sites that contain moles, birth marks, scar tissues or lesions.
- Information for specific clinical scenarios, including for children in spica casts and with congenital limb malformation can be found in the Australian Immunisation Handbook.

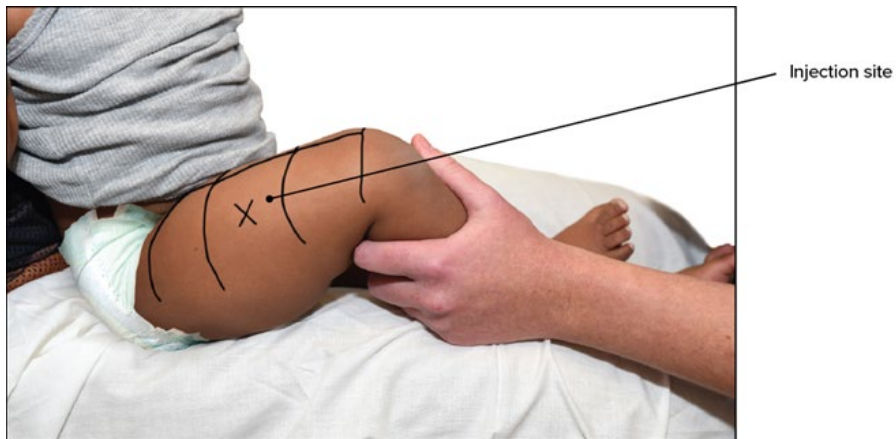
### Recommended injection sites

- **Infants <12 months of age:**
  - The vastus lateralis muscle in the anterolateral thigh is the routinely recommended site.
  - The ventrogluteal area is an alternative site only to be used by providers who are familiar with the landmarks used to identify this site.
  - The deltoid muscle is not recommended for IM injections in this age group.

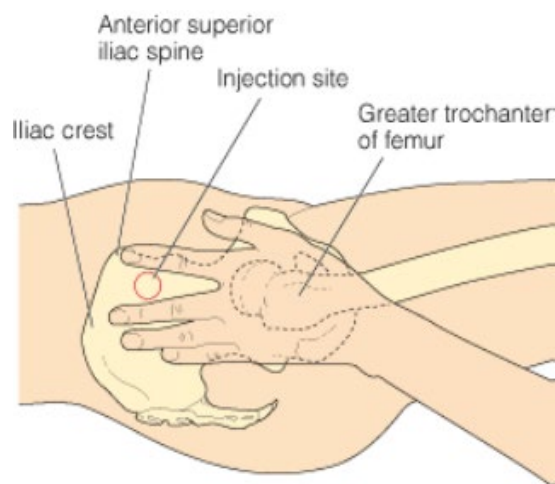


**Figure 1 Vastus Lateralis site<sup>5</sup>**

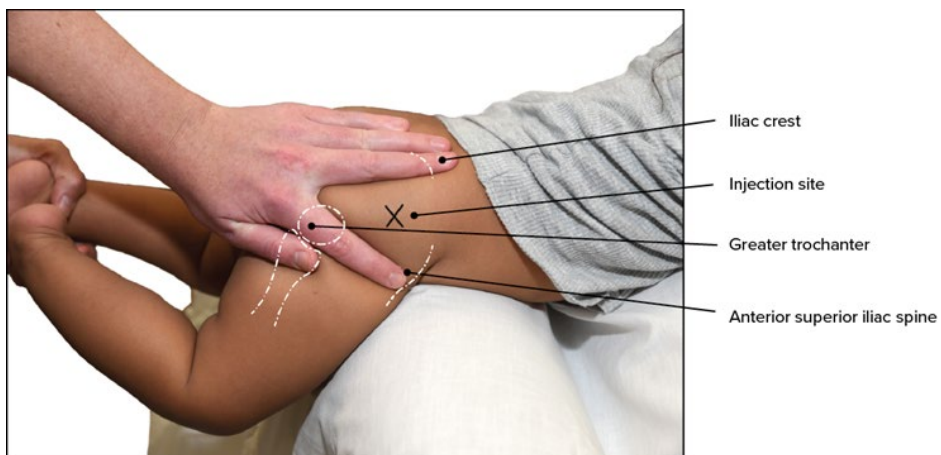




**Figure 2** Vastus lateralis injection site on the anterolateral thigh<sup>5</sup>



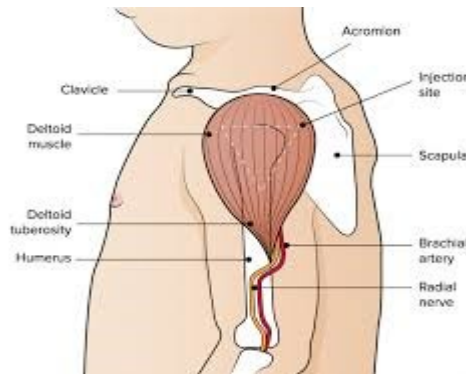
**Figure 3** Ventrogluteal site



**Figure 4** Ventrogluteal site between the iliac crest and anterior superior iliac spine<sup>5</sup>

- **Children >12 months/adolescents or older:**

- The deltoid muscle is the recommended site for IM injection
- The ventrogluteal area is an alternative site only to be used by providers who are familiar with the landmarks used to identify this site
- The vastus lateralis muscle in the anterolateral thigh may also be used for this age group, however, if this site is used, the less locally reactogenic vaccines (e.g. MMR, hepatitis B) should be given in the thigh.



**Figure 5.** Deltoid site<sup>5</sup>

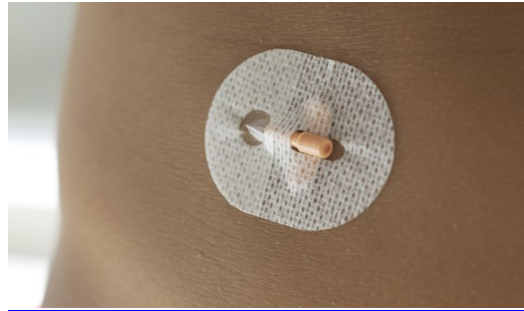
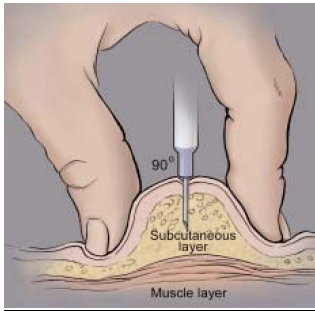
**Table 3. Intramuscular Medication Administration Volumes<sup>5</sup>**

Site of injection	Age	Recommended volume	Additional information
Anterolateral thigh (vastus lateralis)	Neonates	1 mL	Recommended site for children <12 months
	Infants	Up to 3 mL	
Deltoid	≥12 months	Up to 2 mL	Not recommended in children <12 months of age Recommended site for children > 12 months A maximum of 2 mL may be administered following consideration of size of patient and muscle mass development
Ventrogluteal	≥12 months	Up to 3 mL	May be used when multiple injections required during the same visit
Dorsogluteal	≥12 months	Up to 4 mL	Not recommended due to proximity to the sciatic nerve and major blood vessels

Refer to [Local Work Procedure for Intramuscular \(IM\) Medication Administration](#)

## Subcutaneous Medication Administration

Medications can be administered subcutaneously by SC injection (intermittent) (figure 6) or via SC injection via indwelling subcutaneous catheter (ISC) (intermittent or continuous) (figure 7)



- **Figure 6**: SC injection (intermittent) **Figure 7**: SC injection via indwelling subcutaneous catheter (ISC) (intermittent or continuous)

### Standard

- Sites suitable for subcutaneous injections in children are:
  - PREFERABLY upper and lower abdomen, avoiding the umbilical area by 5cm
  - All areas of the buttocks (not for indwelling SC catheters)
  - Anterior, lateral and posterior aspect of the thighs
- Injections SHOULD NOT be given where there is:
  - Altered skin integrity, abrasions, lacerations
  - Contusions, lesions, bruising or rashes
  - Insufficient subcutaneous tissue
  - Another injection has recently been given at the site.

The following factors need to be considered when determining the most appropriate site for injection:

- The volume of medication to be injected
- Amount of subcutaneous tissue available and skin integrity of the site chosen
- Frequency and number of injections previously given at that site

Subcutaneous injections are inserted the full depth of the needle and given at a 90 degree angle, unless there is insufficient subcutaneous tissue, when a 45 degree angle should be used.

- Needles used should be either:
  - 30 gauge needle 8mm in length
  - Injection device for administration of insulin (e.g. insulin pen using 8mm needle)
- Pre-packaged syringe with medication

Children who receive frequent injections (such as insulin, growth hormone or granulocyte colony stimulating factor), must have:

- Injection site changed at each injection
- Injection areas rotated frequently as this helps to prevent lipohypertrophy and therefore maximises absorption.

***Tip for administering medication subcutaneously***

- Do not swab skin if administering:
  - Insulin injection
  - Immunisation in healthy people by SC injection in the outpatients department or as part of an immunisation campaign, unless the skin is visibly dirty

Refer to [Local Work Procedure for Administration of Subcutaneous Medication](#)

## **Subcutaneous Injection via an Indwelling Subcutaneous Catheter**

This may include medicines that are administered via intermittent SC injection or via continuous SC infusion.

Indwelling Subcutaneous Catheters (ISC) (e.g. Insuflon™). This section is based on the guidelines for the insertion, use, and removal of Insuflon™. If another brand of subcutaneous catheter is used, then its manufacturer's instructions need to be followed.

It is recognised some children require daily or continuous medications which can be only given via the subcutaneous route. In an attempt to reduce a child's anxiety and pain an ISC may be inserted.

The ISC is inserted subcutaneously at a 30-45 degree angle. The steel needle, which is used as an introducer is removed. Leaving a soft catheter in place, which can remain in situ for up to 7 days. The Indwelling Subcutaneous Catheter has a self-sealing membrane, in which medication can be injected painlessly.

An ISC can be used to deliver granulocyte colony stimulating factor (GCSF – Filgrastim), heparin, low molecular weight heparins, desmopressin, interferon, opioids, but are not limited to these medications. Staff should refer to the SCHN Paediatric Injectable Medicines Handbook.

In SCHN these catheters are currently being used for administration of enoxaparin (Clexane), opioids and ketamine.

### **Standard**

- Only one type of medication can be given in one indwelling subcutaneous catheter.
- The dead space of Indwelling Subcutaneous Catheters is negligible; therefore, it is unnecessary to flush the catheter pre or post medication delivery. For example, an Insuflon™ Catheter is 0.0075 mL.

- Follow product instructions with regards to priming and flush requirements
- The catheter site needs to be changed after a maximum of 7 days or sooner if there are any signs of redness, pain, swelling, exudate, bleeding, or difficulty injecting.
- Always place the new ISC before removing the old one to ensure rotation of the sites.
- For administering medication through an ISC see procedure below.

Refer to [Local Work Procedure for Insertion and Removal of Indwelling Subcutaneous Catheter](#)

## References and Bibliography

1. Poisons and Therapeutic Goods Act 1966 (NSW) no 31.
2. Institute for Safe Medication Practices. [Internet]. Pennsylvania USA: Institute for Safe Medication Practices; 2023. Independent double checks: Undervalued and misused: Selective use of this strategy can play an important role in medication safety; 2013 Jun 13; [ISMP Medication Safety Alert! Acute care edition]. Available from: <https://www.ismp.org/resources/independent-double-checks-undervalued-and-misused-selective-use-strategy-can-play>. (Accessed 18/07/23)
3. Institute for Safe Medication Practices [Internet]. 2019, June 6. Independent Double Checks: Worth the effort if used judiciously and properly. Institute for Safe Medication Practices (ISMP). Available from. <https://www.ismp.org/resources/independent-double-checks-worth-effort-if-used-judiciously-and-properly> (accessed 18/07/23)
4. The Association for Safe Aseptic Practice [Internet]. London: The Association for Safe Aseptic Practice; 2021. Aseptic Non Touch Technique: The ANTT clinical practice framework. For all invasive procedures from surgery to community care. Version 4.0; 2015; Available from: <https://www.antt.org/resources.html> (accessed 18/07/23)
5. Australian immunisation handbook [Internet]. Canberra: Australian Technical Advisory Group on Immunisation (ATAGI). Australian Government Department of Health and Aged Care; 2022 May. Administration of Vaccines; 2022 Dec. Available from: <https://immunisationhandbook.health.gov.au/contents/vaccination-procedures/administration-of-vaccines> (accessed 18/07/23)
6. Sprite Health [image on Internet]. Austin: Sprite Health; Subcutaneous injection pharmacology; 2023. Available from: <https://spritehealth.com/subcutaneous-injection-pharmacology/> (accessed 18/07/23)
7. Convatec [Internet]. Berkshire: Convatec. Insuflon™ – indwelling catheter; 2022. Available from: <https://www.convatec.com/products/infusion-care/product-type/pc-type-injection-port/315ca64f-8f47-4a21-8b08-bc4292573138/> (accessed 18/07/23)

## Bibliography and Other Reading

8. Centers for Disease Control and Prevention [Internet]. Georgia, USA: U.S. Department of Health & Human Services; 2022. Medication preparation questions; 2019. Available from: [https://www.cdc.gov/injectionsafety/providers/provider\\_faqs\\_med-prep.html](https://www.cdc.gov/injectionsafety/providers/provider_faqs_med-prep.html)
9. Convatec [Internet]. Berkshire: Convatec. Insuflon™ – indwelling catheter; 2022; Available from: <https://www.convatec.com/products/infusion-care/product-type/pc-type-injection-port/315ca64f-8f47-4a21-8b08-bc4292573138/>
10. Elsevier healthcare hub [Internet]. New York: Elsevier Inc; 2023. Medication administration: intramuscular injection (home health care) - CE; 2021 Available from: <https://elsevier.health/en-US/preview/intramuscular-injections-hhc>
11. Gragasin FS, van den Heever ZA, Neethling MB. The incidence of propofol vial coring with blunt needle use is reduced with angled puncture compared with perpendicular puncture. *Anesth Analg*. 2015 Apr;120(4):954-5. Available from: <https://doi.org/10.1213/ane.0000000000000599>
12. Innovation Compounding [Internet]. Georgia, USA: Revelation Pharma Company; 2022. Proper aseptic technique to prevent coring of sterile Vials; 2022. Available from: <https://innovationcompounding.com/tutorial-coring/>.

13. Intramuscular Injections Clinical Guidelines (Nursing) | The Royal Children's Hospital Melbourne. Retrieved December 19, 2022 from [https://www.rch.org.au/rchcpg/hospital\\_clinical\\_guideline\\_index/Intramuscular\\_Injections/#:~:text=The%20recommended%20volume%20is%201ml,is%20a%20rounded%20triangle%20shape](https://www.rch.org.au/rchcpg/hospital_clinical_guideline_index/Intramuscular_Injections/#:~:text=The%20recommended%20volume%20is%201ml,is%20a%20rounded%20triangle%20shape) .
14. ISMP Institute for Safe Medication Practices: an ECRI affiliate [Internet]. Pennsylvania: Institute for Safe Medication Practices; 2023. Independent double checks: worth the effort if used judiciously and properly; 2019 Jun 6. Available from: <https://www.ismp.org/resources/independent-double-checks-worth-effort-if-used-judiciously-and-properly>
15. Kordi M, White BF, Kennedy DJ. Possibility and risk of medication coring in interventional spine procedures. PM&R. 2016 Sep 14 9(3):289-93. Available from: <https://doi.org/10.1016/j.pmrj.2016.09.003>
16. Wong's Nursing Care of Infants and Children Australia and New Zealand Edition – For Professionals, 1<sup>st</sup> Ed. Publication 28 Oct 2021. ISBN 9780729543668. Available from: <https://www.elsevierhealth.com.au/wongs-nursing-care-of-infants-and-children-australia-and-new-zealand-edition-for-professionals-9780729543668.html>
17. Ogston-Tuck S. Intramuscular injection technique: an evidence-based approach. Nurs Stand. 2014 Sep 30;29(4):52-9.
18. Rase M, Hanlon M, Ho L, Duriez D, Zhao C. Vial coring and fragmentation incidence after angled penetration of rubber stoppers with single-use hypodermic needles. Pharm Technol Hosp Pharm. 2021 Sep 01;6(1):20210004. Available from: <https://doi.org/10.1515/pthp-2021-0004>
19. Roth JV. How to enter a medication vial without coring. Anesth Analg. 2007 Apr;104(6):1615. Available from: <https://doi.org/10.1213/01.ane.0000260552.76585.53>
20. Safer care Victoria [Internet]. Victoria: State of Victoria; 2023. Intramuscular injections for neonates; 2021 [cited 2022 Dec 19]; [Neonatal ehandbook]. Available from: <https://www.safercare.vic.gov.au/clinical-guidance/neonatal/intramuscular-injections-for-neonates>
21. Sinclair D. Aseptic technique: Sterile product preparation for non-pharmacy personnel. [PowerPoint presentation]. Michigan: Pharmacy Systems, Inc; 2013. Available from: [https://edutrackr.com/trktrnr/Presentation/hmc\\_badaxe\\_mi/AT2013.pdf](https://edutrackr.com/trktrnr/Presentation/hmc_badaxe_mi/AT2013.pdf).
22. The Association for Safe Aseptic Practice [Internet]. London: The Association for Safe Aseptic Practice; 2021. Aseptic Non Touch Technique: The ANTT clinical practice framework. For all invasive procedure from surgery to community care. Version 4.0; 2015. Available from: <https://www.antt.org/resources.html>
23. The Royal Children's Hospital Melbourne [Internet]. Victoria: The Royal Children's Hospital, Melbourne; 2022. Intramuscular injections; 2022 May [cited 2022 Dec 19]; [Clinical guidelines (nursing)]. Available from: [https://www.rch.org.au/rchcpg/hospital\\_clinical\\_guideline\\_index/Intramuscular\\_Injections/#:~:text=The%20recommended%20volume%20is%201ml,is%20a%20rounded%20triangle%20shape](https://www.rch.org.au/rchcpg/hospital_clinical_guideline_index/Intramuscular_Injections/#:~:text=The%20recommended%20volume%20is%201ml,is%20a%20rounded%20triangle%20shape) .

### **Copyright notice and disclaimer:**

The use of this document outside Sydney Children's Hospitals Network (SCHN), or its reproduction in whole or in part, is subject to acknowledgement that it is the property of SCHN. SCHN has done everything practicable to make this document accurate, up-to-date and in accordance with accepted legislation and standards at the date of publication. SCHN is not responsible for consequences arising from the use of this document outside SCHN. A current version of this document is only available electronically from the Hospitals. If this document is printed, it is only valid to the date of printing.