PERIPHERAL INTRAVENOUS CANNULATION LEARNING PACKAGE
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Introduction

This learning package provides the theoretical knowledge related to Peripheral Intravenous (IV) cannulation following the Peninsula Health clinical practice guidelines.

Peripheral IV cannulation is the establishment of an access into the bloodstream using a cannula that is inserted into a peripheral vein.

Objectives

On completion of this learning package, the reader will be expected to:

- State the accreditation requirements for insertion of a peripheral IV cannula
- Explain the venous anatomy and physiology
- Provide rationale behind the selection of the appropriate site and cannula size for peripheral IV cannulation
- Outline the hospital policy requirements for peripheral IV cannulation
- State the potential complications of peripheral IV cannulation and prevention of these
Accreditation Requirements

Registered Nurses/Midwives and Enrolled Nurses who are intravenous medication endorsed may become accredited to perform peripheral IV cannulation at Peninsula Health. This accreditation is for IV insertion in adult patients only.

To become accredited the nurse must:

- Attend the ‘Peripheral IV Cannulation Workshop’
- Complete the ‘Record of Supervised Practice’ form within 2 months from completion of the workshop. This includes:
  - Observation of two (2) peripheral IV cannulations, then
  - Perform five (5) supervised cannulations
- These cannulations must be observed by a medical officer or a nursing staff member who has been cannulating for more than 12 months
- The final cannulation must be assessed by a Nurse Educator or an accredited IV cannulation supervisor using the IV Cannulation Assessment form ².

Click on the link below to access the IV Cannulation Assessment form under Standard 3.


On completion of 2 observed cannulations and 5 supervised cannulations the Record of Supervised Practice form must be sent to the Continuing Education and Development Unit (CEDU) ².

A record of peripheral IV cannulation accreditation is kept by CEDU and placed on the online reporting system.

Staff that hold current IV cannulation accreditation prior to commencement at Peninsula Health may contact Nurse Education on 7732 or cedu@phcn.vic.gov.au to discuss their accreditation requirements.
Venous Anatomy

Veins carry deoxygenated blood from the tissues back to the heart. They consist of three layers:

1. Tunica Intima
2. Tunica Media
3. Tunica Adventitia

**Tunica Intima**

- This is the inner layer of the vein and consists of a smooth, elastic endothelial lining
- This surface allows for an uninterrupted flow of blood cells through the vein
- Damage to the endothelial lining or introduction of foreign materials can initiate an inflammatory response, such as phlebitis (inflammation of the intimal lining) or thrombus (development of a blood clot)

**Tunica Media**

- This is the middle layer of the vein wall and consists of muscle and elastic tissue
- The nerve fibres that control vasoconstriction, vasodilation and muscle tone are found in this layer
**Tunica Adventitia**

- This is the outer layer of the vein and consists of connective tissue
- The tunica adventitia provides support and protection for the vein
- This layer contains the vessels that supply nutrients to the vein

**Valves**

- Valves are structures within the lumen of the veins that are formed by the endothelial lining of the tunica intima
- They are a system of half-moon shaped flaps that are arranged in pairs
- Valves are predominately found in the large veins of the extremities
- Valves act like ‘trap-doors’ to keep the blood flowing towards the heart
- Valves present as bumps along the course of the vein and also occur at bifurcations (an area where two veins join)

**Veins of the Arm and Hand**

Peninsula Health guidelines state that nurses may only cannulate veins of the lower arm and hand.

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**MAPPING OUT A PLAN**

Become familiar with the veins most commonly used for IV insertion

www.hxbenfit.co/basilic-vein
**Indications**

A peripheral IV cannula may be required for the following reasons:

- Administration of IV fluids/blood products
- Administration of IV medications
- Maintenance of intravenous access

**Contraindications**

The only absolute contraindication for peripheral IV cannulation is when appropriate therapy can be provided by a less invasive route (e.g. orally) \(^4\, 5\).

Relative contraindications to use of a particular extremity include:

- A history of mastectomy or lymph node dissection
- Presence of an arteriovenous shunt or fistula
- Oedema or deep vein thrombosis
- Procedure requirement or injury on extremity

If peripheral IV cannulation is deemed necessary in one of the above conditions it must be discussed with a medical officer.

**Sites to Be Avoided**

- Veins below a previous IV infiltration
- Areas of phlebitis or infection
- Sclerosed or thrombosed veins
- Areas of skin inflammation, disease, bruising or breakdown
- Points of flexion over joints
- Dominant hand or arm
• Inner aspect of wrist or within a 5 cm radius. This will reduce the risk of damage to the radial, median or ulnar nerves.\textsuperscript{4, 6}

### Selecting a Vein

When choosing an appropriate vein, you should consider the following:

- The patient’s medical history
- The patient’s age, size and general condition
- The location and condition of the vein
- The purpose of the cannula
- The type of fluid and medication required
- Hypertonic or irritant solutions must be infused through a vein with ample blood flow.
- The expected duration of IV therapy
- Your cannulation skill.\textsuperscript{3, 4, 6}

The vein that is suitable for cannulation should feel round, firm, elastic and engorged, not hardened, bumpy or flat.

The site of catheter insertion influences the risk of infection and phlebitis. Lower extremity insertions sites are linked to a higher risk of infection than upper extremity sites. Veins on the hands have a lower risk for phlebitis than veins on the wrist.

The general rule is to start at the most distal site available (the hand) and move up as necessary. Starting with the patient’s hand (preferably non-dominant) leaves more proximal sites for subsequent cannulations.

A disposable tourniquet is used to enhance venous dilation by impeding venous return. It is placed 5 – 10cm proximal to the anticipated cannulation site with a pressure that should be greater than venous pressure, but less than arterial pressure. Avoid excessive pressure and prolonged application of the tourniquet to reduce risk of vein injury and haematoma formation.
Additional methods that may be used to enhance venous dilation if required include:

- Placing the anticipated cannulation site below the level of the heart to reduce venous return
- Applying a warm compress to the intended cannulation site
- Gently stroking the vein along its length in a proximal to distal direction

### Selecting a Cannula

Select the device with the shortest length and the smallest diameter that allows for correct administration of the prescribed therapy. This will minimise contact irritation that may cause damage to the vessel intima and will promote blood flow around the cannula.

Keep these general guidelines in mind:

<table>
<thead>
<tr>
<th>Colour</th>
<th>Diameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Orange</td>
<td>14g</td>
<td>Trauma, emergency surgery, large fluid volumes</td>
</tr>
<tr>
<td>Grey</td>
<td>16g</td>
<td>Emergency/major surgery, large fluid volumes</td>
</tr>
<tr>
<td>Green</td>
<td>18g</td>
<td>Surgical patients, optimal for blood administration, large fluid volumes</td>
</tr>
<tr>
<td>Pink</td>
<td>20g</td>
<td>Minor surgery, medical patients, moderate volumes of fluids, medication administration, routine blood transfusion</td>
</tr>
<tr>
<td>Blue</td>
<td>22g</td>
<td>Minor surgery, medical patients, small to moderate fluid volumes, medication administration, routine blood transfusion over 2-4hrs</td>
</tr>
<tr>
<td>Yellow</td>
<td>24g</td>
<td>Paediatrics and adults with small veins. Remember this has a low flow rate</td>
</tr>
</tbody>
</table>

### Patient Identification

You must complete patient identification using three nationally recognised identifiers. These are to be compared to the medical notes that state an IV cannula is required for this patient for current treatment. ¹⁰
**Consent**

A valid and informed consent must be obtained and documented prior to undertaking any non-emergency treatment and/or procedure. Consent for peripheral IV cannulation may be both ‘verbal’ as the procedure is discussed with the patient/client, and ‘implied’ as the patient/client offers their arm for IV cannulation. You must complete patient identification using three nationally recognised identifiers.

**Technique for Insertion**

Aseptic non touch technique is required for peripheral IV cannulation with the goal of minimising contamination of the insertion site and the key parts. An aseptic (procedural) hand wash is required prior to the procedure. The five moments of hand hygiene must be followed throughout the procedure.

A clean trolley and an IV insertion pack must be used to prepare the equipment for peripheral IV cannulation. The insertion site is cleaned with 2% chlorhexidine and 75% alcohol to help prevent catheter related infection. The solution must be allowed to dry for 15-30 seconds prior to cannulation. A non-touch technique must be used and the insertion site should not be re-palpated once it has been cleaned.

A transparent semipermeable occlusive dressing is placed over the insertion site on completion and the date must be recorded on the dressing using the documentation label.

Protective eyewear and sterile gloves must be worn when performing peripheral IV cannulation.

No more than 2 attempts should be made by any one nurse to insert a peripheral IV cannula. This prevents unnecessary trauma to the patient and the potential to limit future vascular access.
Potential Complications

1. Infection

Strict adherence to hand hygiene and the use of aseptic technique in insertion and maintenance is the most important measure to prevent infection.

Other preventative measures include:

- Choosing the appropriate site and cannula size
- Use of 2% chlorhexidine and 70% alcohol to prepare the site and allowing the solution to dry
- Use of sterile gloves for IV cannulation
- Use of a transparent semipermeable dressing over the insertion site
- Review of IV site each shift for patency, inflammation, infection or bruising
- Perform hand hygiene before accessing intravenous site
- Always clean the end cap with an alcohol swab allowing time to dry before accessing. The cap must be replaced each time it is accessed
- Changing the cannula within 72 hours or earlier if signs of phlebitis are present
- Changing the cannula within 24 hours if it placed in ED or in an emergency situation where aseptic technique may be compromised
- Ensuring removal of the cannula when it is no longer required.
2. **Superficial Venous Thrombosis**

Intravenous catheters cause endothelial trauma and inflammation which can lead to venous thrombosis. Signs and symptoms include inflammation, pain and tenderness along the vein and/or oedema.

Factors that can be related to formation of a venous thrombosis include:

- Diameter of catheter relative to size of the vein
- It is recommended to use the smallest diameter catheter appropriate for the patient to allow blood flow around catheter and prevent stagnation of blood
- Catheter related infection
- Refer to preventative measure under 1. **Infection**
- Infusion of irritant solutions
- Ensure all medications are diluted appropriately and the cannula is flushed with normal saline at the completion of medication administration

**Phlebitis** refers to the inflammatory reaction within the vein, usually due to thrombus. Clinical findings include pain, tenderness and inflammation along the vein.

If phlebitis is noted the intravenous cannula must be removed and resited. Superficial phlebitis is generally benign and resolves when the catheter is removed. Elevation of the limb and warm or cool compress may also assist once the catheter has been removed to reduce inflammation.

3. **Haematoma**

Haematoma is the collection of blood that can be formed following a leakage of blood from the vein into the surrounding tissues at the insertion site. It can occur as a result of failure to puncture the vein properly during cannula insertion or following the removal of the cannula.

If a haematoma forms during insertion of a peripheral IV cannula it must be removed immediately and an alternative site accessed with a new cannula.
4. **Infiltration**

Infiltration occurs when the fluid infused through an IV cannula enters the subcutaneous tissue rather than the vein. Leakage into tissues of certain solutions, such as those used for chemotherapy can cause tissue necrosis.

Once a cannula has been inserted it must be flushed with 5-10mls of normal saline to ensure it is patent and correctly situated in the vein.

5. **Air Embolism**

The IV cannula provides a potential port of entry for air into the venous system. Ensure all connections are secure.

6. **Pain**

Pain may occur at the time of peripheral intravenous cannulation. Topical local anaesthetic lotions are not routinely used in adults but may be applied if considered advantageous. Topical local anaesthetics require a medical order \(^3,^6,^8\).
References


