# Insertion and maintenance of peripheral intravenous cannulae

<table>
<thead>
<tr>
<th>TITLE</th>
<th>Policy &amp; Procedures for the Insertion and Maintenance of Peripheral Intravenous Cannulae</th>
</tr>
</thead>
<tbody>
<tr>
<td>SUMMARY</td>
<td>This document provides instruction and guidance to hospital personnel how to insert and maintain peripheral intravenous Cannulae. All Clinical Chairs, Departmental Managers, Heads of Sections and Nursing Officers in charge of wards are required to instigate action to ensure the successful implementation of the policy within their area(s) of control.</td>
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<td>RELATED DOCUMENTS</td>
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Executive summary

- The need for IV access must be assessed prior to insertion. Admission to hospital on its own is not an indication nor are any “just in case” reasons.

- An intravenous cannula should be retained in situ only if intravenous therapy is documented to be required within the next 24 hours and then reviewed daily for as long as the cannula is in-situ.

- Hand hygiene must be performed prior to insertion.

- If hair removal is necessary, scissors or hair clippers should be used.

- The patient’s skin must be cleaned prior to cannula insertion using chlorhexidine gluconate in 70% alcohol and allowed to dry. If this is not available, 70% alcohol is an acceptable alternative.

- If a procedure is not successful and the cannula needs to be withdrawn, DO NOT use the same cannula for another insertion. A new sterile cannula must be used for each attempt at cannulation and every time the skin should be disinfected again as above.

- No more than two attempts at IV peripheral cannulation should be made on any one patient by the same clinician within a 15 minute, unless in an emergency situation. If unsuccessful, the patient should be given a period of rest of 20-30 minutes. Access should then be reassessed and if problems again anticipated, the assistance of another member of staff should be sought.

- The date of insertion must be written clearly on the dressing by the doctor inserting the line and on the PVC insertion sticker.

- If the dressing becomes loose, damp or soiled, it should be changed using an aseptic technique.

- In adults, the aim should be retain IV cannulae in situ no longer than 3 full days after the date of insertion. IV cannulae should be replaced routinely after this period of time unless a risk-assessment has been undertaken which indicates removal would pose a greater risk to the patient. In such exceptional circumstances, the doctor must provide written clinical reasons and instructions to that effect.

- Every IV cannula must be reviewed on a daily basis and the condition of the site documented using the Visual Infusion Phlebitis (VIP) score system. If evidence of inflammation at more than VIP 1 is noted, the cannula should be replaced immediately.
1. Introduction

Peripheral venous cannulae (PVC) provide relatively easy and comfortable access for intravenous therapy for hospitalised patients. However, cannulae present a high risk for healthcare associated infection. Almost two-thirds of bacteraemias in which the source is identified originate from an intravascular device.

Nevertheless, intravenous (IV) cannulation is an invasive procedure which predisposes the patient to an increased risk of local and systemic infection either at the time of insertion or when in-situ. IV cannula related infections are associated with increased morbidity, prolonged hospitalisation and increased costs. These infections are most commonly caused by Staphylococci and originate predominantly from either the flora of the patient’s own skin or from the hands of the health care practitioner.

2. Objectives

This policy aims to standardise the insertion technique and subsequent management of peripheral IV cannulae.
It provides guidance on:
   a. the appropriate assessment and selection of peripheral IV cannulation sites
   b. the procedure of cannulation
   c. care of the cannula site so as to reduce the risk of infection, discomfort, trauma and complications to the patient.
It also sets out the respective areas of responsibilities for doctors and nurses related to insertion and maintenance of IV cannulae

The recommended clinical procedure is recognised to reduce the incidence of cannula related complications, with particular emphasis on associated infection risks.

3. Indications for Intravenous Cannulation

Inappropriate IV cannulation may lead to infection and should be avoided where possible. The need for intravenous cannulation will be determined by the need for intravenous therapy. In all cases first consideration should be for the administration of therapy by alternative routes.

An intravenous cannula should be retained in situ only if intravenous therapy is documented to be required within the next 24 hours. The practice of routine insertion of an intravenous cannula on admission to hospital should be discontinued and IV cannulae inserted only when genuine clinical benefit is ascertained. Furthermore, every
patient admitted to hospital should have his/her IV cannula assessed after 24 hours by a senior doctor in the patient’s firm to establish whether it needs to be retained.

4. Insertion

4.1 Site Selection

The insertion site should be determined by the risk of infection and mechanical complications. It is generally preferable to use the non dominant arm and site the cannula away from elbow and wrist joints to reduce the likelihood of dislodgement through movement and maintain better cannula patency.

Hand veins have a lower risk of phlebitis than veins on the wrist or upper arm. Veins in the lower limbs should not be used routinely in adults due to the increased risk of embolism and thrombophlebitis. The distal veins of the upper extremities should therefore be used, with subsequent attempts done above previous sites. Any cannulae inserted into lower limbs should be re-sited to an upper limb as soon as possible. Avoid bruised, painful or infected skin. If there appears to be no suitable veins in the arms, the assistance of another practitioner skilled in intravenous cannulation should be sought.

4.2 Gauge size

The smallest gauge cannula possible should be used to reduce mechanical irritation, promote rapid dilution of the infusate and reduce risk of infection. The patient’s clinical condition and needs must be taken into account when making this decision.

<table>
<thead>
<tr>
<th>Colour</th>
<th>Gauge</th>
<th>Uses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Orange</td>
<td>14G</td>
<td>Rapid transfusions of whole blood/large volumes of fluids in resuscitation or operating theatre settings</td>
</tr>
<tr>
<td>Grey</td>
<td>16G</td>
<td>Rapid transfusions of large volumes of fluid or viscous fluids.</td>
</tr>
<tr>
<td>White</td>
<td>17G</td>
<td>Blood transfusions or large volumes of fluid</td>
</tr>
<tr>
<td>Green</td>
<td>18G</td>
<td>Infusions of up to 2-3 litres of fluid per day and/or patients on longer term medication.</td>
</tr>
<tr>
<td>Pink</td>
<td>20G</td>
<td>Patients on longer-term medication, oncology patients, paediatric patients, adults with small veins.</td>
</tr>
<tr>
<td>Blue</td>
<td>22G</td>
<td>Children, neonates or elderly patients with particularly fragile veins.</td>
</tr>
<tr>
<td>Yellow</td>
<td>24G</td>
<td></td>
</tr>
</tbody>
</table>
4.3 Equipment

The following equipment is required for inserting an IV cannula. This should be collected prior to starting the procedure and taken to the point of care. All equipment should be checked for sterility and expiry date.

- Skin disinfectant swab (2% Chlorhexidine gluconate in 70% alcohol impregnated swab or 70% alcohol prepad)
- IV Cannula
- Transparent semi-permeable sterile cannula dressing
- Gloves (non-sterile)
- Apron (if not wearing scrubs)
- Tourniquet
- 10ml syringe
- 0.9% Sodium Chloride for intravenous use (10mls)
- Gauze swabs
- Sharps box taken near the patient

4.4 Procedure for cannulation

<table>
<thead>
<tr>
<th>ACTION</th>
<th>RATIONALE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Taking account of the patient’s condition and cannulation history, discuss and explain the procedure to the patient, allowing time to ask questions, ensuring the patient understands.</td>
<td>To obtain informed consent and to prepare the patient psychologically</td>
</tr>
<tr>
<td>2. Gather and prepare equipment (see section 5.3) or open PVC insertion pack. Remove watches and roll up long sleeves. Wear a clean apron (if needed)</td>
<td>To comply with standard precautions</td>
</tr>
<tr>
<td>3. Perform hand hygiene using alcohol hand rub. Place cannula pack upside down and peel it open. Do not touch the cannula at this time. DO NOT put on disposable gloves at this stage</td>
<td>To minimise the risks of cross infection to patient</td>
</tr>
<tr>
<td>4. Place the patient’s arm on a pillow. Apply the tourniquet 6 to 8cm above the insertion site and allow the vein to engorge with blood. Assess suitability of chosen vein i.e. palpable, non-pulsatile, straight and healthy.</td>
<td>To improve chances of successful cannulation</td>
</tr>
<tr>
<td>Step</td>
<td>Instructions</td>
</tr>
<tr>
<td>------</td>
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<tr>
<td>5.</td>
<td>Thoroughly disinfect the skin area to be cannulated with a 2% chlorhexidine gluconate in 70% alcohol pad for 30 seconds (or if unavailable with a 70% alcohol pad). Start at the intended puncture site and move outwards in a circular motion. Leave to dry for up to 30 seconds. Do not re-palpate the vein after disinfection.</td>
</tr>
<tr>
<td>6.</td>
<td>Put on the non-sterile gloves now, avoiding touching the outside of the gloves in doing so. Remove the luer lock cap from the cannula and place it back in the pack – do not place on the bed or table. Do not touch the inside of the luer lock cap. Keep the cannula within the pack but adjust it to be easily accessible for easy handling.</td>
</tr>
<tr>
<td>7.</td>
<td>Apply traction around the skin of the chosen vein</td>
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<tr>
<td>8.</td>
<td>Insert the cannula, bevel side up, into the patient’s vein at an angle of approximately 15 to 25 degrees to the skin depending on the depth of the vein and the amount of sub-cutaneous tissue. Do not at any point touch the needle so as to maintain cannula sterility.</td>
</tr>
<tr>
<td>9.</td>
<td>Stop when blood is seen in the flashback chamber</td>
</tr>
<tr>
<td>10.</td>
<td>Lower the angle of insertion to correspond to vein depth and direction and carefully advance the cannula and stylet up to 5 millimetres into the lumen of the vein. Withdraw the needle stylet slightly to see a second flashback in the length of the cannula. Slowly advance the cannula into the vein in short stages, after each stage gradually withdraw a section of the needle. Never fully remove the needle from the patient until the cannula is fully inserted.</td>
</tr>
<tr>
<td>11.</td>
<td>Once the cannula is fully inserted, release the tourniquet and apply digital pressure to the vein above the cannula tip before completely removing the needle. Once removed, dispose of the needle immediately into the sharps container taken to the bedside.</td>
</tr>
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</table>
### Care and management of IV cannula

Meticulous cannula care following insertion is fundamental to reducing the risk of infection. A clean technique should be used for all IV cannula manipulations.

- Perform hand hygiene using alcohol hand rub *just before touching the cannula*; this should be done even if hand hygiene was performed before approaching the patient.
- Wear clean non-sterile gloves if there is a risk of contact with blood.
- Inspect the insertion site prior to any use. The Visual Infusion Phlebitis (VIP) score (Figure 1) provides an evaluation tool of the cannula insertion site and guides the decision as to whether a new cannula is required.
- If the patient is not receiving continuous infusion, the cannula should be flushed with 0.9% sodium chloride for injection/hepsal before *every* administration of IV drugs in order to establish patency.
- 0.9% sodium chloride for injection should also be used to flush the cannulae between multiple IV drug administrations to reduce the risk of incompatibility.

- Following the completion of IV drug administration, the cannula should again be flushed for a final time with 0.9% sodium chloride for injection.

- A cannula that is being used only for intermittent intravenous therapy should be flushed 12 hourly with 5 to 10mls of 0.9% sodium chloride for injection.

- If the cap is removed from the circuit for whatever reason, *it must be replaced with a new sterile luer-lock cap following each use*. Never handle the luer lock with bare hands or touch the inner side of the cannula cap (even if wearing gloves) since this will introduce micro-organisms directly into the cannula hub and bloodstream.

Where feasible, patients should be encouraged to participate in observation and care of their own cannulae.

6. Daily monitoring of IV cannula

- Every cannula should be reviewed *daily* by the responsible medical officer to establish whether it needs to be retained and, if not, removed immediately.

- Every cannula should be assessed by the responsible nurse to establish if 3 full days have elapsed since insertion as well as to see if any signs of inflammation or phlebitis is present. This should be done as part of the early morning patient profile assessments and documented. If any inflammation is noted or the cannula found to have exceeded its recommended duration, a doctor from the patient’s firm should be informed promptly. Doctors on call should only be involved for IV cannula complications that occur after normal hours.

- Unless previously agreed, the doctor should be informed about the intention to remove an IV cannula. In this way, prompt replacement can be planned, if required.

7. Documentation

Every IV cannula inserted in the ward should be documented on the appropriate forms, except where the cannula is anticipated to be in situ for less than 6 hours. The healthcare professional who inserts the cannula should always write the date and time on the cannula dressing. In the A&E department and operating theatres, the insertion will be documented on the respective forms used in these departments. Once the
patient is transferred to a ward, the VIP score should be documented on the nursing report. It is therefore important that the date and time are clearly present at the time of transfer. If this is not the case, a date and time should be written which would be before the patient is transferred to the ward; in such a case, the time and date would be the one at which patient went into A&E or the operating theatre.

The IV site should then be assessed on a daily basis, as part of patient care activities, according to the Visual Infusion Phlebitis (VIP) score in Figure 1. The appropriate action should be taken according to VIP score. If the cannula is resited, a doctor in the patient’s firm should be informed. All daily reviews, any action taken as well as removal information should be documented accordingly.

**Figure 1. Visual Infusion Phlebitis (VIP) score**
8. IV Cannula Dressing

The IV cannula dressing:

- Protects the puncture site and minimises the possibility of infection between the catheter surface and the skin. The cannula insertion site is an open wound so the dressing must be sterile and applied under aseptic conditions.

- Allows observation of the insertion site. Easy visual inspection without removal of the dressing allows early detection of inflammation, extravasation and collection of blood or pus at the insertion site. It also allows careful observation during the injection of drugs. This assists with keeping infection to a minimum. A transparent or semi-occlusive intravenous cannulation dressing is used so as to reduce the need for frequent IV cannula dressing changes.

- Secure the device in place and prevent movement of the device which damages the vessel.

When a dressing is changed, an aseptic non-touch technique is to be used so as not to introduce micro-organisms from the operator's hands to the IV cannulation site:

- Perform hand hygiene using alcohol hand rub.

- Disinfect the IV cannula entry site with 2% chlorhexidine gluconate in 70% alcohol (or 70% alcohol if not available) and allow to dry.

- Apply new dressing.

9. Removal of IV Cannula

In adults, IV cannulas should be changed after a maximum of 3 days after the date of insertion even if no evidence of phlebitis is present. This duration can be exceeded if clear and exceptional attenuating circumstances exist. In such cases, the clinical reason must be clearly documented by a senior member of the patient’s firm.

If the cannula does not have a clear date written on the dressing, then it should be assumed to have been in place for more than 3 days and replaced immediately.

IV cannula removal technique:

- Perform hand hygiene before any contact with patient and put on non-sterile gloves.
- Release cannula dressing and remove cannula slowly. Apply sterile swab immediately on exit site.
- Prevent haematoma formation by applying digital pressure to the puncture site for at least 3 minutes. Application of dressings does not replace digital pressure.
- Throw away the cannula in domestic waste bin.
- Cover the site with a sterile dressing.
- If the cannula was removed due to signs of phlebitis, continue to observe the site and document treatment and actions taken in the nursing report. If the patient shows evidence of sepsis together with phlebitis of grades 3 or more, the tip of cannula should be sent to the microbiology laboratory for c&s together with the blood cultures.

10. Management of phlebitis incidents

VIP score more than 1

**REMOVE CANNULA URGENTLY**
Inform medical officer
Consider analgesics/anti-inflammatory agents

Yes

Erythema & swelling extends beyond 2cm of exit site and/or presence of pus

No

* Disinfect a scissors with 70% alcohol. Cut the last 2-3 cm of the cannula, place it in a sterile universal container. Add around 3mL sterile saline and send for C&S. If pus/exudate is present, aspirate in a syringe (or if not possible, take a swab) and send for C&S

Does patient have fever and/or rigors?

No

Consider doxycycline 100mg
12-hourly oral

Yes

Apply twice daily:
- kaolin poul tide
  or
- silver sulphadiazine cream
Observe every 12 hours for deterioration
Do NOT apply topical antibiotics

- Take blood cultures
  - Start teicoplanin 6mg/kg/day
  (12-hourly on day one)
11. Responsibilities

Insertion and maintenance of IV cannulae requires joint involvement of both medical and nursing staff.

It is the responsibility of the:

- healthcare worker who inserted the IV cannula to write the date on the IV cannula dressing

- nursing officer of the ward to implement systems to ensure that:
  - patients received into the ward all have a date of insertion on their dressing,
  - every cannula is documented in the PVC section of the nursing report within the patient’s profile.
  - VIP score is documented daily.
  - a doctor is informed of every case where VIP score >1

- medical firm caring for the patient to:
  - review, on a daily basis, the need for the IV cannula and if genuinely required to review the VIP score,
  - ensure that IV cannulae are not kept for no more than 3 full days after insertion unless medically contraindicated
  - document in the IV cannula form if the IV cannula needs to be retained for a longer duration and the reason for this following a risk-assessment.
  - respond in a timely manner when informed of situations where VIP scores >1 have been noted

Bibliography


