GUIDELINE

Peripherally Inserted Central Venous Catheter (PICC)
1. Introduction

This guideline has been developed as part of the I-CARE intervention bundle for the management of intravascular devices (IVDs). The guideline is intended to be used by Hospital and Health Services to support a system for the use and management of invasive devices based on current best practice and evidence for the prevention and control of healthcare associated infection (HAI).

2. General Requirements

- The clinician should choose an appropriate Intravascular Device (IVD) – consider catheter type, number of lumens, length, type of therapy, site of insertion, risk of complications including infection, and patient factors.
- Only competent staff (or training staff supervised by competent staff) should insert IVDs to minimise infection and other complications.
- The clinician should explain to the patient (if possible) or parent/guardian the procedure and need for catheterisation.
- All sterile fields should be set up immediately prior to any procedure by the clinician or suitably trained assistant:
  - trolleys/carts that include all necessary supplies should be dedicated for CVC insertion.
- Accurate documentation and record keeping should be maintained by the clinician to ensure patient safety, to allow for audits, and to track outbreaks of infection. The documentation should include the date and time of insertion including type of IVD, gauge, length of line on insertion and removal, anatomical site, skin preparation solution used, name of operator, site observations and device removal/replacement details.

Education and Competency Assessment

- All staff involved in the insertion and maintenance of IVDs should complete all competency assessments as required by the healthcare facility. A record of this should be maintained by the facility.
- A proportion of patients will be responsible for their own catheter care when discharged from hospital in between treatment regimens. Patients should be provided with theoretical and practical training by a clinician. This should include step-by-step instructions in text and images, of clinical procedures needed for care, including principles and techniques i.e. hygiene, dressing changes, flushing techniques and manipulation of the catheter. Where possible, controlled testing of the patient’s knowledge as well as their practical execution of the techniques should be undertaken by the clinician.

Hand Hygiene

- Healthcare workers should perform hand hygiene with an antiseptic-containing soap solution or use an alcohol-based waterless cleanser:
  - before and after palpating catheter insertion sites
- before and after accessing, repairing, or dressing an intravascular catheter; this includes associated components such as administration sets and access ports.
- The use of gloves does not obviate the need for hand hygiene.
- The clinician should educate patients and carers about the importance of hand hygiene and ask that they remind all caregivers to clean their hands.

**Surveillance**

- Surveillance should be conducted in high-risk patient populations by a facility appointed person to determine healthcare associated (HCA) IVD-related Bloodstream Infection (BSI) rates, monitor trends in rates and assist in identifying lapses in infection control practices.
- A facility-appointed person should:
  - report HCA IVD-related BSIs at least monthly to all stakeholders
  - investigate all clusters of HCA IVD-related BSIs for common cause problems
- The introduction of new products or processes should be monitored to identify any increase or decrease in the occurrence of device associated infection.

**3. Insertion & Management Requirements**

**Insertion Location**

- PICCs should be inserted in an area where asepsis can be maintained (eg. dedicated procedure room or Radiology Suite).
- The catheter tip position should be confirmed by a modified chest x-ray study prior to use:
  - the x-ray should allow visualisation of the catheter along the length of the arm, across the axillary and subclavian veins and into the superior vena cava.
- For potentially difficult/complicated insertions due to patient factors (eg. impalpable vessels, morbid obesity, pre-existing injury), clinicians should consider using ultrasound guided access for PICC placement.

**Catheter Types and Materials**

- Polyurethane or silicone catheters are available in varying sizes, with one or multiple lumens.
- The minimum necessary number of lumens, connectors and ports should be used.
- If total parenteral nutrition is being administered, the clinician should utilise one lumen exclusively for that use.
- Clinicians should use the smallest gauge of PICC that will accommodate the prescribed therapy to reduce the risk of phlebitis:
  - polyurethane is a tougher material, enabling thinner lumen walls and larger internal diameters of the lumina; this significantly increases flow rates and reduces the potential for breakage and rupture of the catheter. However, polyurethane PICCs have a higher risk of thrombosis
  - the decision to use polyurethane catheters should be balanced against the higher risk of thrombosis with these catheters compared to silicone catheters e.g. haematological malignancies.
• PICCs are usually very long to accommodate different lengths of insertion. They are frequently trimmed prior to insertion to prevent dislodgement and for easy handling:
  - in 2005, the Therapeutic Goods Administration (TGA) reissued a report related to the inadvertent cutting of the guide-wire while trimming the length of the catheter at the time of insertion. TGA recommended following manufacturer’s instructions for use when inserting catheters including instructions for shortening the catheter
  - scissors should not be used by clinicians for trimming of PICCs as this may introduce roughness to the catheter, possibly contributing to thrombosis or infection.
• The use of antimicrobial (antibiotic or antiseptic) coated or impregnated PICCs may provide some additional clinical benefit; however cost effectiveness arguments have not been resolved:
  - there is no antimicrobial PICC available on the current Queensland public health system Standing Offer Arrangement (SOA)
  - the decision to use these should be based on local factors such as infection rates.

**Prophylactic Antibiotics**
• Prophylactic antibacterial or antifungal agents (oral, intranasal or parenteral) are not recommended at the time of insertion or during use of a PICC to prevent catheter colonisation or bloodstream infection.
• Antibiotic lock prophylaxis is not recommended – additional studies are required before antimicrobial lock solutions instilled into the catheter lumen(s) can be recommended for preventing Bloodstream Infections (BSI’s).

**Catheter Site Selection**
• Generally PICCs are inserted into the basilic and cephalic veins of the antecubital space or brachial veins:
  - the basilic vein is preferred as it offers the largest diameter of upper extremity vessels and affords a non-tortuous entry into the subclavian vein
  - the cephalic vein (~6mm) is smaller than the basilic vein (~8mm) and angles 90 degrees to enter the terminal portion of the axillary vein, sometimes making catheter advancement difficult
  - brachial veins lie deep in the centre of the mid to upper arm and cannot be outwardly visualised or palpated; ultrasound guidance is required for access
  - the most appropriate location for the tip of PICCs is the lower one-third of the superior vena cava (SVC), close to the junction of the SVC and the right atrium.
• If possible, clinicians should consider the non-dominant arm for ease of self-care.
• PICCs are not advisable in patients with renal failure and impending need for dialysis, in whom preservation of upper-extremity veins is needed for fistula or graft implantation.

**Maximal Barrier Precautions**
• Before placing a PICC (including guide-wire exchanges), the operator and any person who enters the sterile field to assist in the procedure, should use maximal barrier precautions including a cap, mask, sterile gown, sterile gloves, and a sterile full body drape.5
  - don protective eyewear and surgical mask (the mask should cover the nose and mouth tightly)
  - wash hands and forearms for at least three minutes using an antiseptic soap solution and dry with a sterile towel
  - aseptically don sterile long-sleeved gown
- aseptically don sterile gloves (ensure gloves cover cuff of gown)
- prep catheter insertion site, allow to dry (refer: Skin Preparation)
- drape the entire upper body and arm of the patient (while maintaining a sterile field) with a large fenestrated drape leaving only a small opening at the insertion site
- a surgical cap should be used to contain hair that may fall across the operator’s face during the procedure

**Skin Preparation**

- Hair at the insertion site should only be removed by clinicians (prior to antiseptic application), using clippers (not shaved) to improve adherence of the dressing.
- The skin should be physically cleaned by the clinician (if necessary) prior to applying the antiseptic solution and inserting the catheter.
- Removal of skin lipids (defatting) by the clinician with alcohol, ether or acetone is not recommended.
- A solution containing 1-2% chlorhexidine gluconate (CHG) in ≥70% ethyl or isopropyl alcohol (alcoholic chlorhexidine) should be used by the clinician for preparation of the insertion site:
  - non-sterile antiseptic applicators (e.g. swabsticks) should not be placed on the sterile field. However antiseptic liquid solutions are able to be poured into a pot on the sterile field
  - when using non-sterile antiseptic applicators, skin preparation should be undertaken by an alternative staff member who is not gowned and gloved to insert the line.
- If CHG is contraindicated (e.g. sensitivity, allergy, and skin condition) the clinician should use aqueous povidone-iodine 10% or sterile normal saline 0.9% (NB: the drying time for aqueous based antiseptics is longer than alcohol based products).
- 70% alcohol solution (including alcohol-impregnated swabs) should not be used as it has no residual antimicrobial activity on the skin.
- The solution should be applied vigorously by the clinician to an area of skin approximately 30cm in diameter, in a circular motion beginning in the centre of the proposed site and moving outward, for at least 30 seconds:
  - repeat this step three times using a new swab for each application.
- The clinician should allow the antiseptic to air dry completely prior to inserting the catheter; do not wipe or blot.
- Palpation of the insertion site by the clinician should not be performed after the application of antiseptic, unless aseptic technique is maintained.
- Clinicians should not use antimicrobial ointments or creams at the insertion site.5
- The length of the line used should be noted prior to insertion and clearly documented in the patient’s notes.

**Catheter Fixation**

- Adhesive tape (alone) should not be used to secure PICCs.
- Secure the catheter by:
  - suturing at the anchor point, or
  - utilising a sutureless fixation/securement device
    - a sutureless securement device has been shown to be superior in reducing the length of time required to secure the catheter to the skin and avoiding the additional risk of needlestick injury associated with suturing
    - the potential for this device to reduce infection may derive from the elimination of skin suture wounds that are contiguous to the newly inserted catheter and
from minimisation of the to-and-fro pistoning of the catheter, which may promote invasion of the tract by cutaneous microorganisms through capillary action.

- A catheter that has migrated externally should not be readvanced by a clinician prior to restabilisation.

**Dressing Type and Replacement Intervals**

- Sterile, transparent, semi-permeable, self-adhesive, (standard or hyperpermeable), polyurethane dressings should be used by the clinician to protect the site from extrinsic contamination, allow continuous observation of the insertion site, and to help stabilise and secure the catheter.
- A sterile gauze dressing (secured with adhesive tape) should only be used by the clinician if there is a true contraindication to the above including diaphoresis or excessive ooze from the insertion site:
  - a gauze dressing should be replaced by a transparent dressing as soon as possible by the clinician.
- The dressing (including semi-permeable polyurethane types) should not be immersed or submerged in water:
  - showering is preferable to bathing, and swimming should be avoided with any external catheter, in order to prevent colonisation by Gram-negative organisms, especially *Pseudomonas* spp.
- Clinicians should replace semi-permeable dressings on insertion site according to manufacturer’s recommendations OR every 7 days (if hyperpermeable); AND when the dressing becomes damp, loosened, no longer occlusive or adherent, soiled, if there is evidence of inflammation, or excessive accumulation of fluid (especially blood) under the dressing:
  - some authors recommend changing the dressing within 24 hours following PICC insertion due to the likelihood of bleeding at the insertion site
  - for longer-term catheter maintenance in home patients, less frequent dressing changes may be possible depending on patient characteristics relating to perspiration and cleanliness. Semi-permeable dressings generally begin to degrade 2 weeks after application.
- If gauze is used, it should be changed by a clinician at least every 48 hours OR if damp, no longer adherent or soiled:
  - if gauze is used in combination with a semi-permeable dressing, it is considered a gauze dressing and should be changed by the clinician every 48 hours.
- Clinicians should utilise an aseptic technique including sterile dressing (or dressing change) pack with drape and sterile gloves when changing the dressing on a PICC.
- Clinicians should dress each catheter as a separate procedure.

**Dressings: Skin Preparation**

- Alcoholic chlorhexidine is the preferred solution for skin preparation for dressings however, if contraindicated clinicians should use the same solution utilised for skin preparation prior to PICC insertion.
- Most PICC and other catheter materials are generally alcohol-resistant however, alcohol can damage some types of polyurethane and silicone PICC tubing (refer manufacturer’s instructions).
- Removal of skin solids (defatting) by clinicians with alcohol, ether or acetone is not recommended.
- Clinicians should remove blood or ooze from catheter insertion site with sterile 0.9% sodium chloride.
• Clinicians should cleanse the area (the size of the final dressing) around the catheter including under the hub.
• Cleansing should be performed by the clinician using a circular motion moving in concentric circles from the site outward:
  - repeat this step three times using a new swab for each application
  - apply the antiseptic solution meticulously for at least 30 seconds and allow to air dry; do not wipe or blot.
• Clinicians should not use antimicrobial ointments or creams at the insertion site.5
• Antiseptic-impregnated dressings/sponges are effective in reducing vascular catheter bacterial colonisation. However, additional studies are required before dressings/sponges can be recommended for routine use
  - the safety of these dressings/sponges has not been established in low birth weight neonates who may be at risk of skin or systemic toxicity.

**PICC Review**

• PICCs should be reviewed each shift and those that are no longer clearly needed should be promptly removed.
• The insertion site should be examined each shift by a clinician and when accessing the line (or at each dressing change if gauze is used) for erythema, exudate, tenderness, pain, redness, swelling, suture integrity and catheter position:
  - site appearance should not be used as the only indicator of infection as local inflammation is uncommon with PICC-related infection caused by coagulase-negative staphylococci as this pathogen incites little local or systemic inflammation. The patient should also be examined for fever or other signs of sepsis e.g. tachycardia, tachypnoea, hypotension.
• Patients should be encouraged (where possible) by clinicians to report any changes in their catheter site or any new discomfort.5

**In-line Filters**

• In-line filters are not recommended for infection control purposes however, certain chemotherapeutic and immunological drugs require filtering for other reasons:
• lines containing filters should be removed immediately following administration of the drug.

**Flushing and Locking of PICCs**

**General Information**

• Where possible, continuous intravenous fluids should be administered by clinicians using an infusion pump.
• The optimal volume and frequency of flushing and/or locking of catheters for intermittent injections or infusions is unclear:
  - the literature suggests the volume of the flush or lock should equal at least twice the volume of the catheter plus add-on devices1 (if used)
  - the volume of a lumen is generally less than 1mL and a needleless access device 0.1mL, so therefore a (minimum) 2-3mL of solution should be sufficient.
• Only single-dose solutions should be used by clinicians.
• Clinicians should use a 10mL (or larger) syringe to avoid excessive pressure and catheter rupture (syringes smaller than 10mL can produce higher pressure in the lumen and rupture the catheter):
- infusion pressure should never exceed 25 psi because pressures higher than that may also damage blood vessels
- a 3mL syringe generates pressure greater than 25 psi, whereas a 10mL syringe generates less than 10 psi.

- Clinicians should flush in a pulsatile (push-pause or start-stop-start) motion.
- Clinicians should use an aseptic technique including cleaning the access port(s) with a single-use 70% alcohol-impregnated swab and allowing to dry prior to accessing the system.
- Disconnecting the flush syringe allows reflux of blood into the tip of the catheter to displace the space occupied by the syringe. To prevent this source of occlusion, the clinician should clamp the extension set or withdraw the syringe while administering the last 0.5mL of flush (positive pressure technique).
- Positive displacement mechanical valves are designed to reduce retrograde flow into the catheter more effectively than standard luer connectors. The displacement action expels a small amount of the solution used to flush the catheter when the syringe used for flushing is disconnected from the luer. The displacement is a passive feature and occurs automatically:
  - the positive displacement action accomplished with valve technology will not eliminate the problem of occlusion in all PICCs
  - the evidence related to positive displacement mechanical valves is inconclusive regarding their effectiveness in preventing clot formation, particularly in the absence of heparin. Until there is more evidence, flushing or locking PICCs via needleless access port using a positive pressure technique is recommended.

**Flushing of PICCs**

- Flushing is recommended to promote and maintain patency and prevent the mixing of incompatible medications and solutions.
- Sterile 0.9% sodium chloride for injection should be used by a clinician to flush a catheter unless the manufacturer recommends flushing with heparin sodium solution.
- Clinicians should flush catheters immediately:
  - after placement
  - prior to and after fluid infusion or injection (as an empty fluid container lacks infusion pressure and will allow blood reflux into the catheter lumen from normal venous pressure)
  - prior to and after blood drawing.
- The flush solution and flushing intervals should be documented by the clinician in the patient record.

**Locking of PICCs**

- PICCs should not be left *in situ* when no longer required as the risk of infection is greater than risks associated with reininsertion of a new device.
- If it is necessary to lock a PICC the following recommendations should be considered by the clinician:
  - locking involves instilling a solution to prevent occlusion when the device is not in use
  - there is limited information concerning the most appropriate solution to lock a catheter. Heparinised saline has been used primarily due to the antithrombolytic properties of heparin. However, complications such as heparin-induced thrombocytopenia (HIT), altered coagulation studies and bleeding have been reported, particularly if other general anticoagulant therapy is administered. Additionally, heparin is incompatible with certain substances in solution e.g.
- until there is further evidence, sterile sodium chloride 0.9% should be used by clinicians to lock a catheter that is no longer required for continuous infusions in preparation for future use; unless the manufacturer recommends catheter lumens be locked with an alternate solution
- the most important part of locking the catheter is the mechanical action of the procedure itself, designed to prevent backflow of blood into the catheter tip i.e. ‘pulsatile’ and ‘positive pressure’ flushing techniques
- some PICCs integrate valve technology which restricts blood backflow and air embolism by remaining closed when not in use therefore eliminating the need for heparin flushing to maintain patency.

**IV Admixtures**
- Clinicians should admix all intravenous fluids using an aseptic technique.
- Clinicians should not use containers of intravenous fluid that have visible turbidity, leaks, cracks or particulate matter, or if the manufacturer’s expiration date has passed.
- Clinicians should use single-dose vials for parenteral additives or medications when possible.
- Clinicians should use the recommended needle gauge for injecting additives into infusion bags and/or burettes.

**Replacement of IV fluids**
- Clinicians should replace infusions of:
  - standard (crystalloid) and non-lipid parenteral solutions every 24 hours
  - lipid-containing solutions within 24 hours of hanging the solution
  - lipid emulsions alone within 12 hours of hanging the emulsion (if volume considerations require more time, the infusion should be completed within 24 hours)
  - all blood components should be infused within 4 hours unless otherwise specified on product information sheet (with the exception of factor VIII or IX prepared for continuous infusion)
  - drug infusions (e.g. heparin, insulin) every 24 hours.
- When any IVD is resited, both the infusion and administration set should be replaced by the clinician regardless of when the infusion was initially commenced. It is not acceptable to attach a new line to an infusion less than 24 hours old, nor place a device, e.g. a capped needle, over the line in the interim.
- All IV fluids should be stored by facilities according to manufacturer’s guidelines.
- Bags or bottles of intravenous solution should not be used as a common source of supply for multiple patients.³

**Administration Set Changes**
- Clinicians should ensure all components of the administration system are compatible, including needledless intravascular devices to minimise leaks and breaks in the system:
  - add-on equipment should be of luer-lock design.
- Clinicians should leave administration sets that do not contain lipids, blood or blood products in place for intervals of up to 4 days³, unless they become disconnected or the catheter is changed.
• Clinicians should change administration sets used for lipid/lipid-containing parenteral nutrition within 24 hours of initiating the infusion.
• Administration sets used for chemotherapeutic agents should be removed by the clinician immediately after use.
• Clinicians should change administration sets used to infuse propofol at a minimum of 12 hours or as per the manufacturers guidelines.³
• **Blood components**: must be transfused using an administration set approved for this purpose. This must incorporate a standard filter which removes clots and small clumps of debris that may form during collection and storage. The recommended filter pore size is 170-200 micron.⁴
• Any number of red cell units may be transfused during a 12-hour period provided the flow rate remains adequate.⁴ However specific manufacturer’s recommendations defining the maximum number of units per blood administration set must not be exceeded.⁴ Administration sets should be removed by the clinician immediately after use.
• **Heparin infusions**: clinicians should change extension tubing with every syringe change. Both should be changed every 24 hours and when the catheter is changed, to prevent risk of BSI associated with heparin infusions.
• **Other infusions**: extension tubing should be changed when the catheter is changed or following disconnection of the tubing from the catheter.
• Clinicians should not intermittently disconnect administration sets used for continuous infusions, due to the increased risk of infection through manipulation of the hub and occlusion due to reflux of blood into the catheter tip when the line is disconnected.
• Intermittent administration sets should be discarded after each use if disconnected.¹
  - If the administration set is disconnected from the intravascular device the set is to be discarded and a new administration set connected using aseptic technique and observing standard precautions.
  - The set should be disconnected immediately upon suspected contamination and discarded when the integrity of the product or system has been compromised.¹
• Administration sets should not be disconnected (and reconnected at a later time) for the purpose of the patient showering or toileting as this may increase the risk of complications such as infection and catheter occlusion.²

**Medication Labelling**
• Clinicians should abide by labelling recommendations for ALL injectable products prepared in the ward or clinical area, including recommendations for labelling containers (bags, bottles and syringes) and conduits (lines and catheters).⁶

**Intravenous Access Ports**
• Clinicians should minimise catheter manipulation (e.g. number of intermittent infusions).
• Clinicians can use central venous catheters for blood sampling, but it is advisable to limit or avoid this practice because of the increased risk of occlusion (clotting) and infection in the catheter from any residual blood; if necessary clinicians should minimise blood sampling by batching laboratory specimen draws.
Needleless access ports should be used by clinicians according to manufacturer’s recommendations.

Needleless components should be changed as frequently as the administration set.11

All persons handling or accessing the intravascular system should first perform hand hygiene.

All intravenous access ports should be meticulously cleaned by the clinician with a single-use 70% alcohol-impregnated swab and allowed to dry prior to accessing the system. For example a typical intermittent infusion of medication may involve:
- swabbing the port before the initial saline injection to assess catheter patency
- before attaching the sterile infusion tubing or syringe, and
- before flushing and/or locking the catheter with saline after administering the medication.

The intravenous port should be accessed by the clinician with a sterile single-use device.

Stopcocks should be end-capped when not in use.

For continuous infusions, clinicians should:
- change stopcocks at least as frequently as administration set changes
- change needleless access ports per manufacturer’s instructions AND if the integrity of the port is compromised.

For catheters left in situ or lumens with no infusion, clinicians should:
- change luer caps per manufacturer’s instructions AND after each manipulation
- change needleless or closed (IV bung) access ports with no infusion per manufacturer’s instructions OR if the integrity of the port is compromised.

Anytime an access port is removed from a catheter, the clinician should discard it and a new sterile access port should be attached:
- the integrity of the access port should be confirmed by the clinician before and immediately after each use. If the integrity of the port is compromised or if residual blood remains within the port, it should be replaced immediately and consideration given to changing the administration set.

Clinicians should not use adhesive tape as a means of junction securement between the hub and access port or infusion line.

**Blood Culture Collection for Diagnosis of a BSI**


Blood cultures should always be collected by a clinician from a peripheral vessel.
- approximately 20 mL is required and 10 mL should be placed in each of the anaerobic and aerobic blood culture bottles
- staff should read the instructions on the blood culture bottle as different blood culture systems have different requirements
- each anaerobic and aerobic bottle constitutes a blood culture ‘set’.7 No more than 3 sets are required in one episode. Two sets has a sensitivity of >90% while collecting 3 sets will increase that to >98%.7

Taking blood cultures through a PICC is discouraged as the practice may cause occlusion and contribute to catheter lumen colonisation.

Blood for culture should only be collected in addition to peripheral blood, from a PICC where:
- there is no other access available, or
- following placement of a new PICC and only by the operator, or
- attempting to determine if the catheter (lumen) is contaminated.

- If catheter-related bloodstream infection is suspected:
  - the clinician should use strict aseptic technique and hand hygiene prior to blood culture collection to reduce the risk of microbial contamination
  - the clinician should utilise sterile collection equipment
  - the clinician should use standard precautions when collecting blood cultures including sterile gloves and eye protection
  - first sample to be taken peripherally by the clinician; cleanse skin with alcoholic chlorhexidine and allow drying prior to venepuncture
  - additional specimen(s) to be collected by the clinician from each lumen of the (old) catheter. If collecting directly from an indwelling line, the first few millilitres (ml) of blood should be discarded and a note of the collection site/lumen made on the request form
  - the blood culture bottle diaphragm should be swabbed by the clinician with a 70% alcohol-impregnated wipe prior to inoculating the bottle
  - there is no need to change the blood culture collection needle between venipuncture and bottle inoculation (careful skin preparation is a more important factor than changing needles in reducing contamination during blood culture collection).

- Catheter discard blood, arterial line blood, intravenous catheter blood, “left over” blood from blood gas or other analyses should not be used by clinicians for blood cultures.

- If further blood tubes are required for testing, they should be collected by the clinician after blood cultures are drawn.

**Culturing of PICC Tips**

- Routine culture of catheter tips is not recommended however, periodic sampling could be considered in the context of measuring the effectiveness of interventions, this should only occur in consultation with Infection Prevention and Control and the Microbiology Laboratory.

- Culture of vascular catheter tips may be useful in confirming the source of line related bacteraemia when performed concurrently with peripheral blood cultures. Depending on local laboratory practice, vascular catheter tips are only processed if there is an associated positive blood culture. Consult with local laboratory.

- If pus is present at the insertion site, the clinician should swab the site prior to cleaning and send for culture.

- If catheter-related sepsis is suspected:
  - the clinician should clean the skin at the skin-catheter junction with alcoholic chlorhexidine and allow the solution to dry prior to catheter removal – this will minimise skin contamination of the catheter tip
  - the clinician should remove catheter aseptically
  - A segment of the tip of the catheter (optimum length 5cm) should be submitted. The tip should be aseptically cut from the end of the catheter directly into a sterile specimen container. Transport to laboratory as quickly as possible to prevent excessive drying.

**Ethanol Lock Therapy**

Antibiotics may be ineffective in the treatment of infected central venous catheters. This is due to the formation of a biofilm on the internal lumen of the catheter. Biofilm prevents antibiotics penetration to the surface of the inner lumen of the catheter despite
appropriate antibiotic therapy. Ethanol locks have been proven to be effective in treating catheter infections and prolonging the life of the central venous catheter.

- Commencement of ethanol lock therapy should only occur after the patient has been reviewed by the infectious diseases team and following discussion with the treating consultant.

- **Ethanol lock therapy should not be used:**
  - if the patient is unstable
  - if the patient has an exit site or tunnel infection
  - if the patient is pregnant or breast feeding
  - if the patient has *Staphylococcus aureus* bacteraemia, known multi-resistant organism present or fungaemia (including candidaemia).

- **Ethanol lock therapy can be used:**
  - if the patient is stable
  - if the patient has a catheter-associated bloodstream infection
  - if there is no evidence of exit site or tunnel infection
  - if appropriate antibiotic therapy has been initiated
  - if the infectious diseases team and treating consultant agree to commence treatment

- **Prescribing Instructions:**
  - ethanol installation volume and withdrawal volumes and sodium chloride 0.9% flushes and the frequency of locks are to be ordered by an appropriate clinician on the patient medication chart
  - the dwell time for an ethanol lock is four hours. The ethanol lock is to be repeated by a clinician daily for 4-5 days
  - the clinician should aspirate the instilled volume at the conclusion of the dwell time and record this in the patient chart
  - the volume of ethanol to be instilled equals the volume of the lumen plus any connecting tubing. This volume is determined by the PICC type. Refer to the patient chart notes for the manufacturer and serial number of the inserted PICC. Refer to the manufacturer’s reference tables for lumen volume.

- **Dilution:**
  - clinicians should draw up 3.5mL of alcohol 100% (ethanol) and 1.5mL sterile water for injection in a 10mL syringe (makes a total of 5mL of 70%)
  - the clinician should discard excess drug to leave the required volume for the catheter lumen volume
  - the clinician should flush the CVC pre and post ethanol lock with sodium chloride 0.9%. Post flushing of the line should only occur after the alcohol volume has been withdrawn from the CVC at the conclusion of the four hour dwell time.

- Refer to: Flushing and Locking of PICC’s for correct technique to access line.

### Catheter Duration and Replacement

- The PICC should only be replaced on clinical indications i.e. clinical infection +/- purulence at the insertion site.
- Patients transferring from other healthcare facilities with a PICC *in situ* should have the device reviewed by a clinician upon arrival for infectious and mechanical complications.
- Clinicians should continually review the need for central venous access in individual patients.
- Clinicians should replace all fluid administration tubing and connectors when the PICC is replaced.
Guide-wire Exchanges

- Clinicians should not use guide-wire exchanges routinely for PICC’s to prevent infection.
- Guide-wire exchanges of PICCs should not occur in the presence of BSI.
- For guide-wire exchanges, clinicians should use the same meticulous aseptic technique and use of full sterile barriers as used during the insertion of any new PICC.
- After meticulously cleansing the site with the antiseptic solution, inserting the guide-wire, removing the old catheter, and cleaning the site once more with the antiseptic solution, the operator should re-glove and re-drape the site, as the original gloves and drapes are likely to have become contaminated from manipulation of the old catheter.

Removal of PICC

Also refer to local hospital procedure for removal of PICC.

- The clinician should perform hand hygiene and don non-sterile gloves.
- Remove dressing and securement device.
- The clinician should clean site thoroughly with alcoholic chlorhexidine and allow drying prior to removal of catheter.
- Simple traction by the clinician can remove the catheter.
- Digital pressure should be applied by the clinician until haemostasis is achieved.
- The clinician should cover site with gauze and a transparent dressing; the dressing should be changed and the access site assessed every 24 hours until the site is epithelialised.
- On removal the clinician should visually check the integrity of the line to ensure that the tip is present, the complete line has been removed and no breakage has occurred.
- The removed line should be measured and its length documented in patient record and checked against the length documented on insertion.
4. Glossary of Terms

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<thead>
<tr>
<th>Term</th>
<th>Definition / Explanation / Details</th>
<th>Source</th>
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<tbody>
<tr>
<td>Healthcare Associated Infection (HAI)</td>
<td>Healthcare associated infections (HAI) are those infections that are not present or incubating at the time of admission to a healthcare program or facility, develop within a healthcare organisation or are produced by micro-organisms acquired during admission.</td>
<td>ACSQHC¹⁰</td>
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<tr>
<td>Exit-site infection</td>
<td>Inflammation (erythema, warmth, tenderness, induration within 2cm of the exit site) or purulence, confined to the area surrounding the catheter exit site, not extending superiorly beyond the cuff if the catheter is tunnelled, with exudate confirmed to be positive by microscopy/culture and no systemic symptoms or positive blood cultures.</td>
<td>NKF K/DOQI, 2006</td>
</tr>
<tr>
<td>Catheter-related bacteraemia (BSI)</td>
<td>Blood cultures are positive for the presence of bacteria with or without the accompanying symptom of fever, and no apparent source for the infection other than the catheter.</td>
<td>NKF K/DOQI, 2006</td>
</tr>
</tbody>
</table>

5. References


6. Bibliography


56. Parvez B, Parmar N. Trimming of peripherally inserted central venous catheters may increase the risk of thrombosis (Letter to the Editor). Thrombosis Research 2004; 113: 175-177.


7. Document Custodian
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8. Approving Officer
Dr Michael Cleary
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9. Approval Date
4 April 2013

10. Revision History

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<th>Date of Next Revision</th>
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<td>March 2015</td>
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