GUIDELINE

Totally Implantable Central Venous Access Ports
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 (HHS) 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).

<table>
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<th>KEY CRITICAL POINTS</th>
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<td>Only competent staff (or training staff supervised by competent staff) are to insert Totally Implantable Central Venous Access Ports (Ports)</td>
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<td>Accurate documentation and record keeping should be maintained to ensure patient safety</td>
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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.
- 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.

**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
- Ports should be inserted by a clinician in an area where asepsis can be maintained (eg. dedicated procedure room or interventional radiology suite) and where the patient can be monitored.
- Imaging facilities (fluoroscopy, intravenous contrast studies and standard radiography) should be available for the insertion of ports.
- A chest x-ray or other imaging modality should be performed post insertion to confirm placement. A further chest x-ray will be required if the patient becomes dyspnoeic or complains of lateral chest wall discomfort/pain.

Catheter Types and Materials
- Catheters are made of radiopaque silicone rubber or polyurethane:
  - the smallest possible catheter diameter necessary for effective delivery of the therapeutic agent should be used to reduce the risk of catheter-related thrombosis.
- Ports are made of various materials including plastic, titanium, silicone rubber, polyurethane, and a combination of these substances:
  - the life of the septum depends on the gauge of needles used to access the port and the type of needle used i.e. if a larger needle is used, the septum will wear out after fewer punctures than when a smaller gauge needle is used
  - low and high profile ports are available.
- A non-coring (Huber) needle should be used by clinicians to access the port (also refer: Accessing & De-accessing Ports).
- Very little data have been published on novel surfaces (e.g. antimicrobial {antibiotic or antiseptic} coated or impregnated catheters) for long-term devices, therefore the decision to use these should be based on local factors such as infection rates.

Prophylactic Antibiotics
- Evidence to support the routine use of prophylactic (parenteral) antibiotics at the time of insertion of a port to prevent catheter colonisation or bloodstream infection, is limited and there is currently not consensus within the published literature.
- The need for antibiotic prophylaxis prior to vascular access should be determined by each facility after review of local factors including infection rates.
• Anti-infective/microbial lock prophylaxis is not recommended due to concerns of toxicity and emergence of antimicrobial resistance.

**Catheter and Port Site Selection**

• Clinicians should assess specific patient factors such as patient’s age and size, previous procedures, underlying medical problems, anatomic deformity, site restrictions, the relative risk of mechanical complications and the risk of infection. This should also include a vein assessment and history of previous central venous catheterisations.

• The catheter can be inserted into the subclavian, internal jugular, external jugular, basilic or brachial veins by qualified clinicians in the same way as tunnelled catheters (refer: Guideline for Tunnelled CVC).

• Port pocket site selection by clinicians should allow for port placement in an anatomic area that provides good port stability, does not interfere with patient mobility, does not create pressure points or interfere with clothing:
  - insertion of the port should be such that it lies against bony structures for easy access
  - ports near the sternum provide better needle stability and ease of access
  - if patients are accessing their own port, the port is usually located low on the anterior chest wall or upper arm, for easy access
  - when patients are not accessing their own port, then the port is usually located on the upper rib cage near the clavicle.

• Clinicians should consider the amount of cutaneous tissue over the port:
  - too thin a layer of tissue may lead to port erosion
  - if the port is placed too deeply or there is excess adipose tissue, it can make access difficult
  - a tissue thickness of 0.5cm to 2 cm is appropriate
  - placement under the arm, in the breast or the soft tissue of the abdomen should be avoided.

• The port pocket should be made as small and tight as possible and the port sutured to the deep fascia.

• The suture line closing the port should not be located over the septum of the port.

• The catheter tip should be positioned at the junction of the superior vena cava and right atrium.

**Maximal Barrier Precautions**

• Before placing a Port, 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
  - the patient’s hair should be entirely covered with a surgical cap
  - place surgical cap on operator’s head to cover all hair, then don protective eyewear and surgical mask (the mask should cover the nose and mouth tightly)
  - the clinician should wash hands and forearms for at least three minutes using an antiseptic soap solution and dry with a sterile towel
  - the clinician should aseptically don sterile long-sleeved gown
  - the clinician should aseptically don sterile surgical gloves (ensure gloves cover cuff of gown)
  - the clinician should prep catheter insertion site, allow to dry (Refer: Skin Preparation-Insertion site)
  - the clinician should drape the entire body of the patient (while maintaining a sterile field) with a large sterile fenestrated drape leaving only a small opening at the insertion site.
Skin Preparation: Insertion Site

- Hair at the insertion site should only be removed by a clinician (prior to antiseptic application), using clippers (not shaved) to improve adherence of the dressing.
- The skin should be physically cleaned (if necessary) prior to applying the antiseptic solution and inserting the catheter.
- Removal of skin lipids (defatting) by a 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 clinicians 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 is to be undertaken by an alternative staff member who is not gowned and gloved to insert the line.
- If CHG contraindicated (e.g. sensitivity, allergy) povidone-iodine 10% in 70% ethyl alcohol (ethanol) should be used by the clinician (povidone-iodine should remain on the skin for at least 2 minutes or until dry before inserting the catheter).
- If alcohol contraindicated (e.g. sensitivity, allergy, 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 meticulously 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 antiseptic should be allowed to air dry completely prior to inserting the catheter; do not wipe or blot.
- Clinicians should not palpate the insertion site after the application of antiseptic, unless aseptic technique is maintained.
- Antimicrobial ointments or creams should not be used by clinicians under the dressing at the insertion site.
- The length of the line used should be noted prior to insertion and clearly documented in the patients notes.

Post-insertion Care, Dressing Type and Replacement Interval

- Post-insertion care for implantable devices is required only until the incision has healed.
- Care depends in part on the closure used:
  - if external sutures are placed, the incision should be kept dry and covered for as long as 2 weeks or until the sutures are removed (usually 7 - 10 days)
  - if internal sutures or surgical adhesive (glue) are used to close the skin, the incision can get wet the next day. However, it is generally best to keep the incision covered for 1 week if no external sutures have been used.
- Transparent, semi-permeable, self-adhesive, (standard or hyperpermeable), polyurethane dressings are to 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 access needle.
- A sterile gauze dressing (secured with adhesive tape) should only be used 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.
- The dressing (including polyurethane types) should not be immersed or submerged in water.
- Until the sutures are removed, clinicians should replace semi-permeable dressings on exit 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.
- If gauze is used, it should be changed at least every 48 hours OR if damp, no longer adherent or soiled:
  - if gauze is used to stabilise the access needle but not obscure the catheter-skin junction, the dressing is not considered a gauze dressing and should be changed at least every 7 days.
- Clinicians should utilise an aseptic technique including sterile dressing (or dressing change) pack with drape and sterile gloves when changing the dressing on the insertion site.
- Each catheter should be dressed by the clinician as a separate procedure.

### Dressings: Skin Preparation

- Alcoholic chlorhexidine is the preferred solution for skin preparation for dressings however, if contraindicated the clinician should use the same solution utilised for skin preparation prior to port insertion (refer: Skin Preparation-Insertion Site).
- Removal of skin lipids (defatting) by a clinician with alcohol, ether or acetone is not recommended.
- The clinician should remove blood or ooze from the insertion site with sterile 0.9% sodium chloride.
- Cleansing should be performed by the clinician using a circular motion moving in concentric circles from the site outward:
  - clinicians should repeat this step three times using a new swab for each application.
- Clinicians should 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. 

### PORT Review

- Ports should be reviewed each shift by clinicians, and those that are no longer clearly needed should be promptly removed.
- The insertion site should be examined daily by the clinician (or at each dressing change if gauze is used) for erythema, exudate, tenderness, pain, redness, swelling, and suture integrity (whilst in situ):
  - site appearance should not be used as the only indicator of infection as local inflammation is uncommon with CVC-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.
Accessing and De-accessing Ports

General
- Only specially trained clinicians should access and de-access implantable ports.
- Clinicians should perform hand hygiene with an antiseptic containing solution before and after accessing and de-accessing the port.
- Due to the long-term nature of these devices, clinicians should take care not to damage the septum of the port. If damaged, the entire port needs to be replaced:
  - a needle designed to be non-coring (Huber needle) which will not damage the port, is the only needle to be used on an implanted port
  - there is currently no consensus on the optimal time frame for the initiation of port access in the post-placement period
  - if the port is to be used immediately, the needle should be left in place and dressed occlusively, as post-operative oedema and tenderness of the incision make post-surgical access difficult
  - if the port is not used immediately, the needle is removed and a dressing applied over the port pocket incision and the catheter entry site
  - ideally, the port should not be accessed for several days to allow oedema and tenderness to resolve.

Accessing Ports
- A small ice pack over the site for 10 minutes or application of topical local anaesthetic e.g. ‘eutectic mixture of local anaesthetics’ - lignocaine with prilocaine for at least one hour prior to skin disinfection, can be used by clinicians to reduce pain associated with accessing the port:
  - creams can leave a lipid residue that may create a focus for microbial growth; therefore residue of topical anaesthesia should be removed with a soap and water scrub, prior to skin preparation (disinfection)
    - soap and water has been found to be superior to alcohol-impregnated swabs for removing residual lipid from the skin.
- The site of needle placement is determined by palpation of the port by the clinician.
- The clinician should place the patient in a supine position if possible.
- If the patient is coughing or cannot turn their head away from the access site, the clinician should consider having them wear a face mask.
- The clinician should utilise an aseptic technique including sterile dressing (or dressing change) pack with drape and sterile gloves when accessing the port.
- Prior to needle insertion, the skin should be disinfected by the clinician with alcoholic chlorhexidine unless contraindicated (refer: Skin Preparation-Insertion Site):
  - Clean meticulously in a circular motion, beginning in the centre, for a radius of approximately 4cm. Repeat three times using a new swab for each application. Allow to air dry, do not wipe or blot.
- The smallest size non-coring needle that can accommodate the prescribed therapy should be used by the clinician to access the implanted port – 19 to 22 gauge:
  - straight needles are used for flushing the port, drawing blood, or administering bolus injections
  - needles bent at a 90 degree (right) angle are used for longer term therapy
  - this angle allows the device to be more safely anchored to the skin around the port
  - a safety, non-coring needle designed to prevent needlestick injuries when de-accessing the port, is available on Queensland public health system standing offer arrangement (SOA).
• The access needle and extension set should be primed by the clinician with 0.9% normal saline, using a sterile technique; the priming syringe should be left attached:
  - the needle should not be left open to the air when in the port.
• Correct needle placement in ports should be verified by positive aspiration of blood by the clinician prior to administration of medications and solutions. If there is doubt regarding proper needle placement a radiographic dye procedure should be performed to confirm placement:
  - if possible, discard the initial fluid to reduce the risk of septic emboli.
• After needle insertion, and if proceeding with infusion, the clinician should cover the site with a sterile semi-permeable dressing (refer: Post-insertion Care, Dressing Type and Replacement Interval):
  - sterile gauze squares can be used under the semi-permeable dressing to support the access needle at a 90 degree angle.
• To avoid damage to the septum once a port is accessed, the needle should not be ‘rocked or tilted’.
• Needle changes should be undertaken by clinicians every 7 days and as necessary, depending on individual patient circumstances, treatment regime or routine line changes.
• The rotation of insertion points of the access needle reduces the risk of skin breakdown and pocket infection.
• A new needle should be used by the clinician for each access attempt.

De-accessing Ports
• Clinicians should use clean non-sterile gloves when de-accessing a port.
• The clinician should flush catheter with 0.9% sodium chloride to clear it of blood, IV solution, or medication (refer: Flushing and Locking of Ports).
• Because of potential resistance, the port should be stabilised in place with the clinicians gloved, non-dominant hand during needle removal. However, this places the gloved hand in a hazardous position as the contaminated, potentially blood-filled needle is withdrawn from the device due to rebound response:
  - barbing of the needle after placement in the port can also make the needle harder to withdraw
  - a protective or safety device to prevent a rebound needlestick injury, should be used, or an approved needle removal device.
• To reduce the potential for blood backflow into the catheter tip of a port, after clamping the infusion set and stabilising the port, the non-coring needle should be removed slowly straight upward by the clinician.
• After needle removal, the clinician should apply a small sterile dressing over the site for approximately one hour.

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 by the clinician immediately following administration of the drug.

Flushing and Locking of Ports
• The optimal volume and frequency of flushing and/or locking of ports used for intermittent injections or infusions is unclear. Until further evidence becomes available clinicians should refer to the manufacturer’s recommendations for flushing volumes.
• Only single-dose solutions should be used.
• 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 pressures should never exceed 25 psi because pressures higher than that may also damage blood vessels and viscous
  - a 3mL syringe generates pressure greater than 25 psi, whereas a 10mL syringe generates less than 10 psi of pressure.
• Clinicians should flush in a pulsatile (push-pause or start-stop-start) motion.
• Clinicians should use an aseptic technique including cleaning the intravenous access port(s) with a single-use 70% alcohol-impregnated swab and allowing to dry prior to accessing the system.
• Disconnecting the 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, when the tubing extending from the access needle is flushed by the clinician, the extension set should be clamped as the last 0.5mL of fluid is instilled; the access needle is then removed from the port.
• 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 or locking 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 CVCs
  - the evidence related to positive displacement mechanical valves is inconclusive regarding their effectiveness in preventing clot formation. Until there is more evidence, flushing or locking ports via a needle or needleless access port using a positive pressure technique should be used.

Flushing of Ports
• Clinicians should flush Ports 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 clinicians to flush a port unless the manufacturer recommends flushing with heparin sodium solution.
• Ports should be flushed by clinicians immediately:
  - after placement
  - prior to and after fluid infusion (as an empty fluid container lacks infusion pressure and will allow blood reflux into the catheter lumen from normal venous pressure) or injection
  - after blood drawing.
• The flush solution and flushing intervals should be documented by clinicians in the patient record.

Locking Ports
• 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 thrombocytopaenia (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.
gentamicin sulphate (refer: MIMS Online available from:
- until there is further evidence, clinicians should use 5mL of sterile heparinised saline
(10 Units in 1mL) to lock a port that is no longer used for continuous infusions in
preparation for future use; unless the manufacturer recommends catheter lumens be
locked with an alternate solution.
• Ports not being accessed should be flushed and locked every 4 weeks by a clinician:
  - 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 CVCs 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.  

Administration Set Changes
• Clinicians should ensure all components of the administration system are compatible,
  including needleless 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 manufacturer’s 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.¹²
• 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 needless 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.

Management of Infected Ports
General management principles
• Accurate and early diagnosis is essential. Blood cultures should be promptly collected by clinicians on suspicion of catheter-related BSI.
• Exit-site infections without clinical or microbiological evidence of BSI may be able to be treated with catheter retention and local exit site care with or without systemic antibiotic therapy.
• Port-pocket infections without clinical or microbiological evidence of BSI may be able to be treated with local wound care and systemic antibiotics. If systemic signs of sepsis develop, port removal and systemic antibiotic therapy is usually required.
• Catheter-related BSIs require prompt initiation of empiric systemic antibiotic therapy, subsequent modification of antibiotic therapy based upon microbiological results, consideration of port removal, and investigation for metastatic complications (e.g. endocarditis).
• In some situations the use of ethanol lock therapy can preserve a CVC. (Refer: Ethanol Lock Therapy).
• The duration of antibiotic therapy depends upon clinical response, culture results, and the presence of metastatic infective complications.
**Blood Culture Collection for Diagnosis of BSI**

This procedure should be read in conjunction with local hospital procedure for blood culture collection and Pathology Queensland and CHRISP Recommendations for Blood Collection – Adults (http://qis.health.qld.gov.au/DocumentManagement/Default.aspx?DocumentID=26423 Queensland Health Intranet access only)

- 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’. 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

- The practice of taking blood cultures solely through a port is discouraged due to the risk of reservoir colonisation from residual blood.

- Blood for culture should only be collected in addition to peripheral blood, from a port where:
  - there is no other access available, or
  - attempting to determine if the port 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 to dry prior to venipuncture
  - additional specimen(s) to be collected from the reservoir– the clinician should swab skin over the reservoir with alcoholic chlorhexidine. If collecting directly from a port, the first few millilitres (ml) of blood should be discarded and a note of the collection site made on the request form
  - the blood culture bottle diaphragm should be swabbed by the clinician with a single-use 70% alcohol-impregnated swab prior to inoculating the bottle
  - there is no need for the clinician to change the blood culture collection needle between venipuncture and bottle inoculation7 (careful skin preparation is a more important factor than changing needles in reducing contamination during blood culture collection).
    - only specially trained clinicians should collect blood from a port
    - de-accessing the port can result in a ‘rebound’ needlestick injury. A safe method of removing the needle from the port including needles with inbuilt safety devices is recommended.

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

- If further blood tubes are required for testing, they should be collected by the clinician after the blood cultures are drawn.7
Culturing of Ports

- Routine culturing of port sites, reservoirs or catheter tips is not recommended however, periodic sampling could be considered in the context of measuring the effectiveness of interventions 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 port 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 with alcoholic chlorhexidine and allow the solution to dry prior to port/catheter removal – this will minimise skin contamination of the catheter tip (also refer: Removal of a Port)
  - the clinician should remove reservoir and 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.
  - swabs should be collected from the subcutaneous pocket by the clinician.

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 a *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, 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 ethanol lock is four hours. The ethanol lock is to be repeated by clinicians daily for 4-5 days
- clinicians 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 CVC type. Refer to the patient chart notes for the manufacturer and serial number of the inserted CVC. Refer to the manufacturer’s reference tables for lumen volume.

- Dilution:
  - the clinician 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 clinician has withdrawn the alcohol volume from the port at the conclusion of the four hour dwell time.

**Catheter Duration and Replacement**

- The maximum length of time a port can remain in place has not yet been determined but have been reported to be used for as long as 5 years or up to 2000 needle punctures:
  - replace ports only on clinical indications i.e. clinical infection
  - patients transferring from other healthcare facilities with a port in situ should have this 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 port is replaced.

**Removal of a Port**

- Also refer to local hospital procedure for removal of implanted ports.
- Ports require surgical removal in theatre or equivalent:
  - port removal, like insertion, requires meticulous technique to prevent air embolism and to maintain sterile conditions
  - generally, the port pocket is incised, sutures holding the port body removed and the catheter is withdrawn from the vein
  - 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 and checked against the length documented on insertion.
- Upon removal, digital pressure should be applied by the clinician until haemostasis is achieved:
  - a sterile occlusive dressing should be applied to the access site
  - after port removal, the dressing should be changed and the access site assessed every 24 hours by the clinician until the site is epithelialised.
4. Glossary of Terms

<table>
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<tr>
<th>Term</th>
<th>Definition / Explanation / Details</th>
<th>Source</th>
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<tbody>
<tr>
<td>Catheter-related bacteremia (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>
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<td>Exit-site infection</td>
<td>Localised at the skin wound or in the needle-access site over the port and manifested by local tenderness, pain, erythema, induration and oedema.</td>
<td>Australian Commission on Safety and Quality in Healthcare (ACSQHC)⁹</td>
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<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, but develop within a healthcare organisation, or are produced by micro-organisms acquired during admission.</td>
<td>ACSQHC⁹</td>
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<tr>
<td>Port-pocket infection</td>
<td>Induration, erythema and tenderness around the port with culture positive material aspirated from the port pocket.</td>
<td>Biffi et al¹¹</td>
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5. References

6. Bibliography

7. Document Custodian
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8. Approving Officer
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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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